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Flying Operations

A/OA-10--OPERATIONS PROCEDURES



COMPLIANCE WITH THIS PUBLICATION IS MANDATORY

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This instruction implements AFPD 11-2, *Aircraft Rules and Procedures*; AFPD 11-4, *Aviation Service*; and AFI 11-202V3, *General Flight Rules*. It applies to all A/OA-10 units. Selected paragraphs of this publication do not apply to Air National Guard units and members. MAJCOMs/DRUs/FOAs are to forward proposed MAJCOM/DRU/FOA-level supplements to this instruction to HQ USAF/XOOT, through HQ ACC/DOTV, for approval prior to publication IAW AFPD 11-2. Copies of MAJCOM/DRU/FOA-level supplements, after approved and published, will be provided by the issuing MAJCOM/DRU/FOA to HQ AFFSA/XOF, HQ ACC/DOTV, and the user MAJCOM/DRU/FOA and NGB offices of primary responsibility. Field units below MAJCOM/DRU/FOA level will forward copies of their supplements to this publication to their parent MAJCOM/DRU/FOA office of primary responsibility for post publication review. **NOTE:** The terms Direct Reporting Unit (DRU) and Field Operating Agency (FOA) as used in this paragraph refer only to those DRUs/FOAs that report directly to HQ USAF. Keep supplements current by complying with AFI 33-360V1, *Publications Management Program*. See paragraph 1.3. of this instruction for guidance on submitting comments and suggesting improvements to this publication.

This instruction contains references to the following field (subordinate level) publications which, until converted to departmental level publications may be obtained from the respective MAJCOM publication office:

Publications: MCR 55-125 (ACC) and ACCR 55-26.

NOTE: This publication incorporates all using MAJCOM supplements using the paragraph supplementation method. Supplemental material is prefaced with the MAJCOM to which it applies, i.e., (USAFE).

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Chapter 1

INTRODUCTION

1.1. General:

1.1.1. **Scope.** This volume outlines those procedures applicable to the safe operation of the A/OA-10 aircraft. With the complementary references cited, this volume prescribes standard operational procedures for all USAF A/OA-10 pilots.

1.1.2. **Pilot's Responsibility.** This volume, in conjunction with other governing directives, prescribes procedures for A/OA-10 aircraft under most circumstances, but is not to be used as a substitute for sound judgment or common sense. Operations or procedures not specifically addressed may be accomplished if they enhance safe, effective mission accomplishment.

1.1.3. **Deviations.** Deviations from these procedures require specific approval of the MAJCOM (ANG) unless an urgent requirement or an aircraft emergency dictates otherwise. In this case, the pilot in command will take the appropriate action to safely recover the aircraft.

1.1.4. **References.** This instruction, in conjunction with the documents listed in the subparagraphs below, are the primary references for A/OA-10 operating procedures. Training units may develop phase manuals from the procedures contained in these documents. Phase manuals may expand these basic procedures; however, in no case will they be less restrictive, nor will they change the procedures in these documents.

1.1.4.1. T.O. 1A-10A-1.

1.1.4.2. T.O. 1A-10A-34-1-1.

1.1.4.3. AFTTP 3-1V3, *Tactical Employment--A/OA-10* (formerly MCM 3-1V3)

1.1.4.4. AFTTP 3-3V3, *Combat Aircraft Fundamentals--A/OA-10* (formerly MCH 11-A/OA10V5).

1.1.4.5. AFI 11-214, *Aircrew, Weapons Director, and Terminal Attack Controller Procedures for Air Operation.*

1.2. Waivers. Forward waiver requests through appropriate channels to the applicable MAJCOM DO for approval. Approved waivers are granted for a period of 1 calendar year.

1.3. Recommended Changes. Recommendations for improvements to this volume will be submitted on AF Form 847, **Recommendation for Change of Publication**, to the parent MAJCOM (NGB). Recommendations approved will be forwarded to MAJCOM Office of Primary Responsibility (MCOPR) (HQ ACC/DOTV).

Chapter 2

MISSION PLANNING

2.1. Responsibilities. Individual pilots and the operations and intelligence functions of tactical flying organizations jointly share the responsibility for mission planning.

2.2. General Procedures. Accomplish sufficient flight planning to ensure safe mission accomplishment to include fuel requirements, map preparation and takeoff/landing data.

2.2.1. (USAFE) In addition, consult the following for mission planning:

2.2.1.1. (USAFE) Applicable country Military Aeronautical Information Publication (MAIP).

2.2.1.2. (USAFE) AFCENT Low Fly Handbook.

2.2.1.3. (USAFE) DOD FLIP Planning Europe, Africa, and Middle East.

2.2.1.4. (USAFE) UK Military Low Flying Handbook.

2.2.1.5. AFI 11-202V3 (AFI 11-206), *General Flight Rules*.

2.2.1.6. (USAFE) USAFEI 11-202, *Control of Aircraft for Off-Station Sorties*.

2.2.1.7. AFI 11-214, *Aircrew, Weapons Director, and Terminal Attack Controller Procedures for Air Operations*.

2.2.1.8. (USAFE) USAFER 55-125, *Preparation of Mission Planning Materials (Tactical Aircraft)*.

2.2.1.9. (USAFE) USAFEI 11-210, *USAFE Buffer Zone (BZ) Procedures*.

2.2.2. (PACAF) Planned flights over water, outside of the local training area (e.g., deployments, cross countries, Programmed Delivery for Maintenance (PDM) inputs, etc.) will be accomplished two-ship as a minimum. Single ship over water flights, outside of the local training area, require operations group commander approval.

2.3. Map/Chart Preparation:

2.3.1. **Local Area Maps.** A local area map is not required if pilot aids include jettison areas, divert information, controlled bail-out areas and provide sufficient detail of the local area to remain within assigned training areas.

2.3.2. **Charts.** Flight Information Publication (FLIP) enroute charts may be used instead of maps on navigational flights within areas adequately covered by these charts.

2.3.3. **Low Altitude Maps.** On low altitude flights, each pilot in the flight will carry a current map of the low altitude route/operating area. The map will be of such scale and quality that terrain features, hazards, and chart annotations are of sufficient detail to allow individual navigation and safe mission accomplishment. Prepare maps for low-level navigation IAW MCR 55-125, *Preparation of Mission Planning Materials (Tactical Aircraft)*, and/or as directed locally. Annotate a route abort altitude (RAA) on all maps (see paragraph 3.17.16.). Update maps from the Chart Update Manual (CHUM) and highlight (circle, highlight with marker, etc.) all man-made obstacles above the planned flight altitude. For VFR Military Training routes (VR), time and/or distance tick marks will be anno-

tated on the maps to ensure positive positional awareness for obstacles along the planned route of flight.

2.4. Briefing/Debriefing:

2.4.1. **Flight Leader's Responsibility.** Flight leaders are responsible for presenting a logical briefing that promotes safe, effective mission accomplishment. Use briefing guides to provide the flight leader/briefer with a reference list of items that may apply to particular missions. Items listed may be briefed in any sequence. Those items understood by all participants may be briefed as "standard." Specific items not pertinent to the mission need not be covered. When flying with dissimilar aircraft in formation, brief proper position (to ensure adequate wingtip clearance) responsibilities, and aircraft-unique requirements for each phase of flight. If applicable, brief chase procedures to include taxi, takeoff, departure, formation rejoins, emergencies, no radio (NORDO) procedures, and weather contingencies.

2.4.1.1. Briefings will normally begin at least 1 and 1/2 hours before scheduled takeoff.

2.4.1.2. Structure the flight briefing to accommodate the experience and capabilities of each pilot in the flight.

2.4.1.3. Each flight will brief an alternate mission. The alternate mission will be less complex than the primary and should parallel the primary mission. If not parallel, brief the specific mission elements that are different.

2.4.1.4. Mission elements/events may be modified and briefed airborne as long as flight safety is not compromised. Unbriefed missions/events will not be flown. Flight leads will ensure changes are acknowledged by all flight members.

2.4.1.5. Debrief all missions.

2.4.2. **Deployed Operations, Exercise, and Quick Turn Briefings.** If all flight members attend an initial or mass flight briefing, the flight lead on subsequent flights need brief only those items that have changed from the previous flight(s).

2.4.2.1. (PACAF) On multiple-go days when aircraft turn times do not allow for follow-on mission brief(s) and only an initial flight briefing is accomplished for all goes, the following guidance will apply:

2.4.2.1.1. (PACAF) Upgrade missions will be planned for the first sortie flown. Subsequent missions flown should be of equal or less complexity with no upgrade training planned without OG/CC approval.

2.4.2.1.2. (PACAF) Aircrews participating in continuation training may fly their primary or alternate missions in any sequence. The alternate mission will be less complex than the primary mission.

2.4.3. **Mission Briefing Guides.** Mission briefing guides are included as attachments to this instruction. Units may augment these guides as necessary. Pending development by a higher headquarters, units that fly missions not covered by this instruction or its supplements (for example, OT&E weapons delivery profiles) will develop and maintain briefing guides for those missions, and submit the guides to MAJCOM/DO for review.

2.5. Unit-Developed Checklist/Local Pilot Aids:

2.5.1. Unit developed checklists of flight manual checklists may be used provided they contain, as a minimum, all items (verbatim and in order) listed in the applicable checklist.

2.5.2. Locally developed pilot aids will be produced. As a minimum, include the following:

2.5.2.1. Briefing guides.

2.5.2.2. Local UHF/VHF/FM channelization, and airfield diagrams.

2.5.2.3. Impoundment procedures, emergency action checklists, and NORDO/divert information.

2.5.2.4. Cross-country procedures to include: command and control, engine documentation, Joint Oil Analysis Program (JOAP) samples, servicing, manual reversion ground checks and other information as deemed necessary by individual units (e.g., stereo flight plans, turnaround procedures, local training areas and bailout/jettison areas).

2.6. Mission Data Cards. Squadron-generated line-up cards may be used if they contain the necessary information for the type of mission being flown. As a minimum, required items are:

2.6.1. Callsign.

2.6.2. Minimum Takeoff Landing Data (TOLD) requirements on Mission Data Cards are

2.6.2.1. acceleration check speed,

2.6.2.2. refusal/maximum abort speed (dry/wet),

2.6.2.3. takeoff speed/distance, and

2.6.2.4. normal/heavyweight landing distance (dry/wet).

2.6.3. Joker and Bingo fuels will be annotated.

Chapter 3

NORMAL OPERATING PROCEDURES

3.1. Ground Visual Signals. Normally, pilot and ground crew will communicate by the intercom system during all start-engine, pre-taxi and End of Runway (EOR) checks. Use the intercom system to the maximum extent possible anytime maintenance technicians are performing "redballs" on the aircraft. The pilot will not activate any system that could pose any danger to the ground crew prior to receiving proper acknowledgment from ground personnel. When not using ground intercom, visual signals will be in accordance with AFI 11-218, *Aircraft Operation and Movement on the Ground*, and this volume. The crew chief will repeat the given signal when it is safe to operate the system. The following signals augment AFI 11-218:

- 3.1.1. **Auxiliary Power Unit (APU) Start.** Pilot rotates three fingers above head in a circular motion.
- 3.1.2. **Engine Start.** Pilot rotates hand above head in a circular motion with one finger extended to signal for a left engine start or two fingers extended to signal for a right engine start.
- 3.1.3. **Flight Control Check.** Raise arm, clench fist, and make a stirring motion.
- 3.1.4. **Trim Check.** Pilot forms a "T" with hands: then raises one finger for elevator trim, two for an aileron trim, and three for rudder trim while each system is being checked for proper movement.
- 3.1.5. **Brake Check.** Hold left or right arm horizontal, open hand and push forward, breaking at the wrist (as in applying rudder pedal pressure with feet).
- 3.1.6. **Slat Check.** Pilot points to transducer vane.
- 3.1.7. **Gun/Armament Check.** Point index finger forward with thumb upward simulating a pistol and shake head (Yes or No).

3.2. Starting Engines and Before Taxiing:

- 3.2.1. Pilots will be cleared by the crew chief prior to starting the Auxiliary Power Unit (APU), engines or actuating flight controls.
- 3.2.2. All flights require the bleed air function of the APU.
- 3.2.3. Aircraft stall warning devices will be fully operational for all flights.
- 3.2.4. (USAFE) In addition to the requirements of AFI 11-206, *General Flight Rules*, and flight information publication (FLIP), the following equipment will be operative for all flights:
 - 3.2.4.1. (USAFE) Tactical air navigation (TACAN).
 - 3.2.4.2. (USAFE) Heading attitude reference system (HARS).
 - 3.2.4.3. (USAFE) Standby attitude indicator.
 - 3.2.4.4. (USAFE) Identification friend or foe/selective identification feature (IFF/SIF), Modes 3A and C.

3.3. Taxi:

3.3.1. Minimum taxi interval is 150 feet. Spacing may be reduced when holding short of or entering the runway.

3.3.1.1. Minimum taxi interval is 300 feet when operating on a Runway Conditions Reading (RCR) of less than 12.

3.3.2. **Quick Check and Arming.** Place hands in view of ground personnel while the quick check inspection, arming/de-arming, and/or hot refueling are in progress.

3.3.2.1. (USAFE) At all US Air Force bases, an end-of-runway (EOR) inspection will be performed immediately before takeoff at a designated location, usually near the end of the runway. At non-US Air Forces bases, the pilot will attempt to coordinate an EOR inspection with the host unit.

3.3.3. Do not taxi in front of aircraft being armed/de-armed with forward firing ordnance.

3.3.4. When ice or snow is present, aircraft will not be taxied until all portions of the taxi route and runway have been checked for safe conditions. Units will specify minimum runway condition reading (RCR) for taxi operations.

3.4. Flight Lineup. Flights will line up appropriately based on weather conditions, runway conditions and runway width. Spacing between separated elements/flights will be a minimum of 500 feet. If performing formation takeoffs, wingmen must maintain wingtip clearance with their element leader. If runway width precludes line up with wingtip clearance between all aircraft in the flight, use 500 feet spacing between elements or delay run-up until the preceding aircraft has released brakes.

3.4.1. (USAFE) Place wingman on the upwind side if the crosswind component exceeds 5 knots.

3.5. Lineup Checks. After completing the "Lineup Checks" and prior to takeoff, all flight members will inspect each other for proper configuration and any abnormalities. Wingmen will indicate they are ready for takeoff by a head nod, radio call, or landing/taxi light signal as briefed.

3.6. Takeoff:

3.6.1. Do not attempt a takeoff if the RCR is less than 12 or as specified otherwise by MAJCOM.

3.6.1.1. Per MAJCOM guidance, OG/CC may waive RCR minimum for specified units operating in cold weather locations, but in no case will takeoffs be conducted with an RCR of less than 8.

3.6.1.1.1. (AFRC/ANG) OG/CC may waive RCR minimum for specified ANG/AFRC units operating in cold weather locations, but in no case will takeoffs be conducted with an RCR of less than 9.

3.6.1.1.2. (PACAF) 354 OG/CC may waive the minimum RCR for takeoff to 8. If waived, the following restrictions apply. When the RCR is less than 12, a run-up check will not be performed prior to brake release, the takeoff roll will not be started until the preceding aircraft is airborne, and if the crosswind component exceeds the RCR, takeoffs are prohibited.

3.6.2. On training missions, do not takeoff if the computed takeoff roll exceeds 80 percent of the available runway single ship, or 70 percent for a formation takeoff.

3.6.3. If a VFR takeoff is required for mission accomplishment, the aircraft must be capable of achieving a minimum single-engine climb rate of 150 feet/minute (gear up, failed engine windmilling,

and all jettisonable stores-jettisoned), unless a higher rate of climb is required for unique obstacle clearance requirements. IFR takeoffs will be conducted IAW AFI 11-202V3. Aircraft operating under IFR that are unable to comply with the required minimum climb gradients may be required to reduce fuel and ordnance loads, cart all stores (except electronic countermeasures pods), or wait for environmental conditions to change. If operational requirements dictate, takeoffs may be made without a positive single-engine climb rate when approved by wing/group commander.

3.6.4. If operational requirements dictate, intersection takeoffs may be approved by the wing/group commander.

3.6.5. Takeoff interval between aircraft/elements will be a minimum of 10 seconds except for chased takeoffs. When accomplishing a join-up on top or when carrying live ordnance, (excluding 30mm, rockets, flares or air-to-air missiles) increase takeoff interval to a minimum of 20 seconds.

3.7. Formation Takeoff:

3.7.1. Formation takeoffs are restricted to elements of two aircraft.

3.7.1.1. (USAFE) Minimum weather for formation takeoffs is 300 feet/1.6 km. Weather must also be according to AFI 11-202V3 (AFI 11-206) takeoff minimums, and must be at or above the minimum for the most restrictive pilot weather category (PWC) in the formation.

3.7.2. A qualified flight leader will lead all elements unless an Instructor Pilot (IP), or flight lead qualified squadron supervisor, is in the element.

3.7.3. Formation takeoffs will not be made when:

3.7.3.1. Runway width is less than 140 feet.

3.7.3.2. Standing water, ice, slush or snow is on the runway.

3.7.3.3. RCR is less than 12.

3.7.3.4. The crosswind or gust component exceeds 15 knots.

3.7.3.5. Computed takeoff roll in excess of 70 percent of available runway length.

3.7.3.6. Loaded with live munitions (excluding 30mm, rockets, flares or air-to-air missiles).

3.7.3.7. Ferrying aircraft from contractor/ALC facilities.

3.7.4. Configure aircraft so as not to exceed an asymmetrical load moment of 12,000 foot-pounds.

3.7.4.1. When asymmetrical loading is expected to create a noticeable rolling moment, the runway line-up will be such that both aircraft will not roll toward each other on liftoff.

3.7.4.2. Formation takeoffs with aircraft not similarly configured can be made if the asymmetry in configurations include one of the following

3.7.4.2.1. a rack plus practice bombs,

3.7.4.2.2. a rocket/flare dispenser,

3.7.4.2.3. a TGM 65, or

3.7.4.2.4. an air-to-air missile or an ECM pod (except ALQ-184).

3.7.5. Differences in aircraft gross weight will not exceed 2,000 pounds. Takeoff data will be computed for the heavier aircraft.

3.7.6. **Formation Takeoff Procedures.** Refer to AFTTP 3-3V3 (formerly MCH 11-A/OA10V5).

3.7.6.1. On the flight leader's signal, set the core RPM at 90 percent or as briefed by the flight leader and check the engine instruments.

3.7.6.2. Smoothly add power after brake release. If lead needs to reduce power for the wingman on takeoff, he will not reduce throttles beyond 3 percent below predicted takeoff fan speed.

3.7.6.3. Maintain wingtip clearance throughout takeoff roll. If the wingman overruns the leader, the leader will direct the wingman to assume the lead, at which time the wingman will push up to MAX power, maintain his side of the runway, and make his own takeoff. The original leader will then be responsible for in-flight separation and directing appropriate measures to regain flight integrity or initiate lost wingman procedures. The original wingman will fly the briefed departure until instructed otherwise by the flight leader.

3.7.6.4. Retract the gear after the flight leader observes the wingman to be safely airborne.

3.8. Join-up/Rejoin:

3.8.1. Day weather criteria for a join-up underneath a ceiling is 1,500 feet and 3 miles.

3.8.1.1. Flight leaders will maintain 200 KIAS until join-up is accomplished unless briefed otherwise.

3.8.1.2. If accomplishing a turning join-up, the flight leader will normally not exceed 30 degrees of bank.

3.8.1.3. Flight members will join in sequence. For a straight ahead rejoin, the number two aircraft will join on the left wing and the element will join on the right wing unless otherwise briefed. For a turning rejoin, the number two aircraft will rejoin on the inside of the turn and the element to the outside. If mission or flight requirements dictate, the flight leader will specifically call and state the desired formation positions.

3.8.1.4. For further join-up procedures, see paragraph **3.10.** and **Chapter 4.**

3.9. Formation, General:

3.9.1. The flight lead will supervise formations. The flight lead retains responsibility for the flight regardless of which physical position he flies. Wingmen should have the situational awareness to be prepared to fly the number one position if, in the judgment of the flight lead, such action is warranted. The term element lead may be used to designate the number three aircraft in a flight of four--this, in itself, does not imply flight lead authority.

3.9.2. Do not perform rolling maneuvers during join-up/rejoins to nontactical formation.

3.9.3. Do not perform rolling maneuvers to maintain or regain position below 5,000 feet AGL or in airspace where aerobatics are prohibited.

3.9.4. Airborne visual signals will be in accordance with AFI 11-205, *Aircraft Cockpit and Formation Flight Signals*. For four ship flights, initiate configuration changes by radio call, when practical. When formation position changes are directed by radio, all wingmen will acknowledge prior to initi-

ating the change. A radio call is mandatory when directing position changes at night or under instrument conditions.

3.9.5. Flight leaders will not break up formations until each pilot has a positive fix from which to navigate (visual, Air Traffic Control (ATC), INS, or TACAN).

3.9.6. In IMC, maximum flight size in close formation is four aircraft except when flying in formation with a tanker (refer to T.O. 1-1C-1-26).

3.9.7. **Changing Leads.** Refer to AFTTP 3-3V3 (formerly MCH 11-A/OA10V5).

3.9.7.1. The minimum altitude for changing leads within a formation/element in day VMC is 500 feet AGL over land or 1,000 feet AGL over water, except for emergencies (for night see paragraph [3.19.4](#); for IMC, see paragraph [4.6](#)).

3.9.7.2. Do not initiate lead changes with the wingman further aft of normal fingertip, route, or greater than 30 degrees back from line abreast.

3.9.7.3. Prior to initiating the lead change, the leader will ensure that the wingman assuming the lead is in a position to safely initiate the lead change and maintain visual contact.

3.9.8. **Transitioning to IMC:**

3.9.8.1. When flying in VMC with a high potential for entering instrument meteorological conditions (IMC), flight leads should place their formations in close, route, or trail. Avoid using wedge or fighting wing to skirt marginal weather.

3.9.8.2. If loss of sight inadvertently occurs due to weather while in a VMC formation, the following applies:

3.9.8.2.1. Maintain VMC if feasible; transmit "call sign, blind, altitude, and heading."

3.9.8.2.2. If unable to maintain VMC, immediately transition to instruments, recover to level or climbing flight, and execute the appropriate lost wingman procedures. The flight lead will ensure altitude separation between other aircraft in the flight until separate Instrument Flight Rules (IFR) clearances can be obtained.

3.9.8.2.3. If unable to maintain VMC while low level, execute low level abort procedure while transitioning to instruments. See paragraph [3.17.16](#).

3.9.9. Wingmen may practice low-level navigation/low altitude tactical navigation (LLN/LATN) provided the route was thoroughly briefed and the flight lead maintains navigation situational awareness. Wingmen may lead other portions of a mission provided an instructor pilot (IP) or flight lead qualified squadron supervisor is in the same element.

3.9.10. **Dissimilar Formation.** Dissimilar aircraft may be flown in the same formation if mission requirements dictate or to expedite traffic flow during departures and recoveries. Specific procedures will be thoroughly briefed before flight.

3.9.11. (USAFE) **Close Formation.** Except for lazy-eight or chandelle-type maneuvers, close formation aerobatics will not be flown.

3.10. Tactical Formations:

3.10.1. **Tactical Maneuvering.** Refer to AFTTP 3-1 (formerly MCM 3-1), AFTTP 3-3V3 (formerly MCH 11-A/OA10V5), and MAJCOM directives. The following rules apply for flight path deconfliction during tactical maneuvering:

3.10.1.1. Flight/element leads will consider wingman/element position and ability to safely perform a maneuver before directing it.

3.10.1.2. Wingmen/elements maneuver relative to the flight lead/lead element and maintain sight. Trailing aircraft/elements will be responsible for deconflicting with lead aircraft/elements.

3.10.1.3. Wingmen/elements go high and/or outside of the lead/lead element for deconfliction when required.

3.10.1.4. For rejoins from tactical formation, the wingman will join to the side of the formation occupied at the time the rejoin is directed. If in trail, join to the left side. In all cases, the trailing element will join to the side opposite the number two, unless otherwise directed.

3.10.2. **Lost Visual Contact.** The following procedures apply when one or more flight members/elements lose visual contact within the formation.

3.10.2.1. If any flight member/element calls "blind," then the other flight member/element will immediately confirm a "visual" with an informative/directive radio call.

3.10.2.2. If the other flight member/element is also blind, then the flight leader will take action to ensure altitude separation between flight members/elements by referencing the altimeter. Use a minimum of 500 feet altitude separation when directed to deconflict. Avoid, if possible, climbs/descents through the deconfliction altitude. Low Altitude Safety and Targeting Enhancement (LASTE) Heads-Up Display (HUD) altimeter readings should not be used as the primary altitude reference for deconfliction due to the likelihood of significantly different altimeter readings if not operating the HUD in NAV mode.

3.10.2.3. If there is no timely acknowledgment of the original "blind" call, then the flight member/element initiating the call will maneuver away from the last known position of the other flight member/element and alter altitude.

3.10.2.4. If visual contact is still not regained, the flight leader will take additional positive action to ensure flight path deconfliction within both the flight and the scenario to include a "Terminate/Knock-It-Off," as appropriate. Consider scenario restrictions such as sanctuary altitudes and/or adversary blocks.

3.10.2.5. Aircraft will maintain altitude separation until regaining visual and, if necessary, will navigate with altitude separation until regaining mutual support.

3.10.3. **Two-Ship.** Normally, the wingman is responsible for flight path deconfliction. The flight lead has primary responsibility for deconfliction when:

3.10.3.1. Tactical maneuvering places the leader in the wingman's "blind cone" or forces the wingman's primary attention away from the leader (e.g., wingman becomes engaged fighter).

3.10.3.2. The wingman calls "padlocked."

3.10.3.3. The wingman calls "blind."

3.10.3.4. Primary deconfliction responsibility transfers back to the wingman once the wingman acknowledges a visual on his lead.

3.10.4. **Three/Four-Ship (or Greater).** When flights of more than two aircraft are in tactical formation:

3.10.4.1. Formation visual signals performed by a flight/element leader pertain only to the associated element unless specified otherwise by the flight leader.

3.10.4.2. Trailing aircraft/element(s) will maintain a sufficient distance back so that primary emphasis during formation maneuvering/turns is on low altitude awareness and deconfliction within elements, not on deconfliction between elements.

3.11. Chase Formation. Refer to AFTTP 3-3V3 (formerly MCH 11-A/OA10V5).

3.11.1. Restrictions:

3.11.1.1. Any pilot may fly safety chase for aircraft under emergency or impending emergency conditions. Qualified pilots (including Initial Qualification Training (IQT)/MQT pilots who have successfully completed an Instrument/ Qualification evaluation) may chase as safety observer for aircraft performing simulated instrument flight, hung ordnance recovery, or simulated single engine patterns. All other chase events will be flown only by flight examiners, IPs, upgrading IPs supervised by an IP, or flight lead qualified squadron supervisors.

3.11.1.2. During takeoff, the chase aircraft will maintain a minimum of nose-to-tail and wing tip clearance. All formation takeoff restriction apply except chased takeoffs may be accomplished if computed takeoff roll is in excess of 70 percent of available runway length and/or the crosswind or gust component exceeds 15 knots. Brief specific abort procedures.

3.11.1.2.1. (USAFE) All restrictions which apply to formation takeoffs and landings also apply to chase takeoffs and landings.

3.11.1.3. In flight, the chase aircraft will maneuver as necessary, but must maintain nose-tail separation. The chase will not stack below the lead aircraft below 1,000 feet AGL.

3.11.1.3.1. When moving into close formation from chase, the chase pilot will make a radio call indicating intentions. This call will be acknowledged. The chase pilot will also make a radio call indicating intentions to return to the chase position.

3.11.1.3.2. (USAFE) Chase position is dictated by event being chased and the proficiency of both pilots. As a minimum, the chase aircraft will maintain nose-tail clearance.

3.11.1.4. In the traffic pattern, the chase aircraft may maneuver as necessary to observe performance.

3.11.1.5. **Confidence Maneuver Chase.** The chase pilot will fly a pattern well clear of the maneuvering aircraft's flight path. The chase aircraft will not perform the confidence maneuver simultaneously.

3.11.1.6. If anticipating or encountering weather conditions which may preclude an IP or flight examiner from fulfilling their responsibilities, select an alternate course of action based on the qualifications of the pilot receiving the instruction/evaluation.

3.11.1.7. When chasing live ordnance missions, the chase pilot is responsible for ensuring safe escape criteria is met.

3.11.1.8. A safety observer in a chase aircraft will maneuver in an approximate 30 to 60 degree cone with nose/tail clearance to 1,000 feet, to provide assistance and effective clearing. The chase aircraft will not stack below the lead aircraft below 1,000 feet AGL.

3.11.1.9. Except for Functional Check Flights (FCF), a safety observer (Combat Mission Ready [CMR] or Basic Mission Ready [BMC] pilot) is required when performing manual reversion.

3.12. Show Formation. Refer to AFI 11-209, *Air Force Participation in Aerial Events*, and applicable MAJCOM directives for guidance. Specifically, brief these formations and fly them IAW applicable directives and AFTTP 3-3V3 (formerly MCH 11-A/OA10V5). Wing/group commander approval is required.

3.12.1. (USAFE) Airshow formations will be flown according to USAFER 55-20, *USAFE Participation in Aerial Events*.

3.13. Maneuvering Parameters:

3.13.1. Use TO 1A-10-1, MAJCOM operating procedures, AFTTP 3-1 (formerly MCM 3-1), and AFTTP 3-3V3 (formerly MCH 11-A/OA10V5) to define and describe the performance of weapons deliveries, confidence maneuvers, aerobatics, Air Combat Training (ACBT), or advanced handling maneuvers.

3.13.2. G-Awareness exercise will be accomplished IAW AFI 11-214 and MAJCOM guidance. Any mission that plans or is likely to maneuver in excess of five Gs will accomplish the exercise IAW AFTTP 3-3V3. Missions planned at five Gs or less are not required to perform this exercise.

3.13.2.1. (ACC/ANG/AFRC/USAFE) If this exercise is performed at night, aircrews with or without night vision goggles must have enough visual cues to perform this maneuver. Briefings for night G-awareness maneuvers will emphasize wingman deconfliction procedures and maintaining spatial/situational awareness throughout the maneuver. If visibility or discernable horizon is inadequate to fly this maneuver visually, aircrews will not perform the G-awareness exercise and will limit their maneuvering to five Gs.

3.13.2.2. (PACAF) This exercise will only be accomplished in VMC conditions with enough visual cues to perform the maneuver. This exercise will be performed at night only with night vision goggles. Briefings for night G-awareness maneuvers will emphasize wingman deconfliction procedures and maintaining spatial/situational awareness throughout the maneuver. If the G-awareness exercise is not accomplished, aircrews will limit their maneuvering to five Gs.

3.13.2.3. (ACC/ANG/PACAF/USAFE) G-awareness exercises will be filmed in HUD and in Hot Mic. In addition, the tactical portion of all basic missions (BFM, SA, ACM, etc.) will be flown in Hot Mic to enable assessment of the anti-G straining maneuver. For high task sorties (DACT, Composite Force, Opposed SAT, etc.), it is highly desirable for aircrews to fly in Hot Mic.

3.13.3. Minimum Altitudes:

3.13.3.1. Confidence Maneuvers--Entry will be made at a minimum of 10,000 feet AGL.

3.13.3.2. Do not perform aerobatics below 5,000 feet AGL.

3.13.4. **Vortices/Jetwash.** Avoid flight through wing tip vortices/jetwash. If unavoidable, unload the aircraft immediately to approximately 1 G.

3.13.5. **Use of Flaps.** Do not use flaps as an in-flight maneuvering aid in the conduct of aerial combat maneuvers. The Maneuver (MVR) position may be used in the landing pattern, when loitering, when escorting another aircraft, etc.

3.14. Ops Checks:

3.14.1. Accomplish sufficient ops checks to ensure safe mission accomplishment. Increase the frequency during tactical maneuvering at high power settings. Ops checks are required:

3.14.1.1. During climb or at level-off after takeoff.

3.14.1.2. When internal wing tanks or external fuel tanks (if carried) are empty. When internal wing tanks are dry, ops checks will include "wings dry." When carrying external tanks, ops checks will include "tanks feeding" or "tanks dry" as appropriate. Once the external tank(s) and/or internal wing tanks are confirmed and called dry, omit this call from subsequent ops checks.

3.14.1.3. After completing air refueling.

3.14.1.4. Prior to each Dissimilar Air Combat Training (D)ACBT engagement.

3.14.1.5. Prior to entering an air-to-surface range, once while on the range if making multiple passes, and after departing the range.

3.14.2. Minimum items to check are engine instruments, total fuel, internal/external fuel quantities/balance, G-suit connection, oxygen system, and cabin altitude.

3.14.3. Carefully monitor fuel system operation throughout the flight. Monitor fuel in each internal and external tank to verify that fuel is transferring properly and that fuel distribution is correct.

3.14.4. For formation flights, the flight leader will initiate ops checks by radio call or visual signal.

3.14.4.1. Wingmen will respond by radio call or visual signal and include total fuel reading and malfunctions, if any.

3.15. Radio Procedures. Use the complete flight call sign anytime any flight member initiates a radio transmission. In all other cases, an acknowledgment by flight position is sufficient. A "Terminate" or "Knock-It-Off" radio call should be made to terminate maneuvering for any reason, and may be made by any flight member, particularly when a dangerous situation is developing. This transmission applies to all phases of flight and all missions. All participants will acknowledge by repeating the call.

3.15.1. Brief the use of backup/alternate radios within a flight and monitor closely. Use of these radios as an "intra-flight intercom" or for administrative information that should be held for debriefing is inappropriate and constitutes poor radio discipline.

3.15.2. The flight/mission leader will initiate all radio checks and channel changes and each flight member will acknowledge, in turn, prior to any flight member switching channels. **EXCEPTION:** During prebriefed radio silent training or limited comm operations, channel changes will be as briefed.

3.15.2.1. (ANG) Units that regularly operate in high density radio traffic areas may establish alternate procedures in [Chapter 8](#) for use in those areas.

3.15.3. Individual flight members, in turn, will acknowledge radio checks that do not require the transmission of specific data. Acknowledgment by the individual flight member indicates the initiation or completion of the appropriate check.

3.15.4. If a flight member fails to check in after a reasonable length of time, the flight leader will attempt contact on another radio (UHF, FM, or VHF). If unsuccessful, the flight leader may direct a member of the flight, or the entire flight, back to the previous or pre-briefed frequency to regain radio contact. He may also use or direct the use of visual signals to get the missing member on proper frequency.

3.15.5. In addition to the standard radio procedures outlined in AFI 11-202V3, *General Flight Rules*; *Specific Mission Guides*; and FLIP publications; the following radio transmissions are required:

3.15.5.1. All flight members will acknowledge understanding the initial ATC clearance. Acknowledge subsequent ATC instructions when directed by the flight lead or anytime during trail departures.

3.15.5.2. Each pilot will make an individual gear check on base leg or if making a VFR straight-in approach, not later than 3 miles on final. When conducting instrument approaches, make gear checks in response to ATC instructions or no later than the final approach fix or glide path interception point. The wingman or chase need not make this call during a formation or chased approach.

3.15.6. When requiring simultaneous action by other flight members, the voice command will be followed by the word of execution "NOW."

3.15.7. Brevity code and other terminology will be IAW AFI 11-214 and AFTTP 3-1 (formerly MCM 3-1).

3.16. Airborne Communications Jamming Procedures. Refer to AFI 11-214.

3.17. General Low Altitude Procedures:

3.17.1. Fly low-level formation positions/tactics using AFTTP 3-1 (formerly MCM 3-1) and AFTTP 3-3V3 (formerly MCH 11-A/OA10V5) as guides.

3.17.2. Fly line abreast formation at or above 300 feet AGL. When flying in formation below 300 feet AGL the wingman will be directed to a wedge, trail, or combat trail formation position. Training in the 300 to 100 feet AGL altitude block will be in short segments consistent with real-world risks and realistic tactical considerations.

3.17.3. During briefings, emphasis will be on low altitude flight maneuvering, effects of task saturation, time to ground impact, and observation of terrain features/obstacles along the route of flight. For low altitude training over water or featureless terrain, include specific considerations for operations with emphasis on minimum altitudes and spatial disorientation.

3.17.4. At altitudes below 1,000 feet AGL, wingmen will not fly at a lower AGL altitude than lead.

3.17.5. Flights operating in the low altitude environment will climb to a prebriefed safe altitude (minimum 1,000 feet AGL) when a Knock-It-Off is called.

3.17.6. Navigate using a combination of pilotage, dead reckoning (DR) and INS information. DR will be the primary means of navigation.

3.17.7. If unable to visually acquire or ensure lateral separation from known vertical obstructions, which are a factor to the planned route or flight, flight leads will direct a climb to ensure vertical separation 2NM prior to the obstacle.

3.17.8. When crossing high or hilly terrain, do not exceed 120 degrees of bank. Limit zero or negative G crossings to upright bunting maneuvers that are within the zero/negative G limitations for the aircraft and external stores.

3.17.9. Minimum flight planning airspeed for low altitude flight/navigation is 240 KIAS. Minimum airspeed during low altitude flight/navigation is 200 KIAS.

3.17.10. For aircraft equipped with an operable radar altimeter, the system will be on and set at either the briefed minimum altitude or the command-directed low level altitude, whichever is higher. This restriction also applies to simulated and actual weapons delivery events.

3.17.11. The unit commander, IAW AFI 11-2A/OA-10V1, *A/OA-10--Aircrew Training*, as supplemented, will determine and certify a pilot's minimum altitude. Pilots participating in approved step-down training programs will comply with the requirements and restrictions of that program. Unless higher altitudes are specified by national rules, route restrictions, or training syllabus, the following minimum altitudes apply to low level training:

3.17.11.1. 500 feet AGL for:

3.17.11.1.1. Formal Training Unit (FTU) students and instructors when conducting training IAW an applicable syllabus.

3.17.11.1.2. Pilots who have not entered step-down training or are not certified for flight at lower altitudes.

3.17.11.1.3. Overwater flight if duration is more than 1 minute or if out of sight of land or if there is an indefinite horizon.

3.17.11.2. 100 feet AGL for:

3.17.11.2.1. Designated pilots during day operations.

3.17.12. Minimum Safe Altitude (MSA) will provide a clearance of 1,000 feet above the highest obstacle/terrain feature (rounded to the next highest 100 feet) within 5 NM of the planned course, route boundaries, or operating area (e.g. military operating area (MOA), low fly area, restricted area, etc.). Aircrews may compute an MSA for each leg/segment of the intended route of flight.

3.17.12.1. For night (non-NVG) or IMC operations, the minimum altitude is MSA.

3.17.13. When external tanks are installed, do not fly missions requiring tactical maneuvering at low altitudes.

3.17.14. During all low altitude operations, the immediate reaction to task saturation, diverted attention, or an emergency, is to climb.

3.17.15. Weather minimums for visual low-level training will be 1,500 feet and 3 miles for any route or area or as specified in FLIP for Military Training Routes (i.e., 3,000/5 for VR routes), whichever is higher.

3.17.16. **Low-Level Route/Area Abort Procedures.** Compute and brief a low-level route abort altitude (RAA). The RAA will provide a clearance of 1,000 feet above the highest obstacle/terrain fea-

ture (rounded to the next highest 100 feet) within 5 NM of the entire planned course, route boundaries or operating area (e.g., MOA, low fly area, restricted area, etc.). Minimum airspeed for the route abort is 160 KIAS. Maximum pitch angle is 30 degrees nose high.

3.17.16.1. VMC Route/Area Abort Procedures:

- 3.17.16.1.1. Maintain safe separation from the terrain.
- 3.17.16.1.2. Comply with VFR altitude restrictions and squawk appropriate (IFF/SIF) modes and codes.
- 3.17.16.1.3. Maintain VMC at all times. If unable, follow IMC procedures outlined below.
- 3.17.16.1.4. Attempt contact with controlling agency, if required.

3.17.16.2. IMC Route/Area Abort Procedures:

- 3.17.16.2.1. During low level flight, every safe effort will be made to avoid entering IMC. If IMC is encountered, pilots will transmit Call sign, knock-it-off and route abort.
- 3.17.16.2.2. Immediately climb to, or above the briefed RAA. Transition to instruments if entering IMC.
- 3.17.16.2.3. (USAFE) Flight leads will ensure safe separation while complying with host nation procedures. Route abort using the current altimeter until changed by the flight lead.
- 3.17.16.2.4. Maintain preplanned ground track. Execute appropriate lost wingman procedures if necessary. The flight/element leader is responsible for ensuring heading and/or altitude deconfliction during an IMC route abort procedure. Ensure altitude deconfliction is based on the prebriefed altimeter setting.
- 3.17.16.2.5. (USAFE) Always squawk in compliance with host nation procedures.
- 3.17.16.2.6. If required to deviate from normal route/area procedures, or if the RAA is higher than the vertical limits of the route/area, squawk (IFF/SIF) emergency.
- 3.17.16.2.7. Attempt contact with the appropriate ATC agency for an IFR clearance. If required to fly in IMC without an IFR clearance, cruise at appropriate VFR altitudes until receiving an IFR clearance.
- 3.17.16.2.8. (USAFE) Flight leads will direct a frequency change and attempt contact with the appropriate ATC agency. Request instrument flight rules (IFR) traffic separation if visual meteorological conditions (VMC) cannot be maintained.

3.17.16.3. (USAFE) The lowest RAA will be according to national rules as follows:

- 3.17.16.3.1. (USAFE) Aircraft operating in the Republic of Germany (GM) should follow national rules; i.e., same RAA for all flight members.
- 3.17.16.3.2. (USAFE) Route abort is an emergency procedure and pilot judgment is paramount. Flight leaders will ensure aircraft separation using heading deconfliction, radar, formation spacing, timing, and altitude separation as required. If altitude separation is necessary to avoid a collision, the flight leader will direct the appropriate action.

3.18. Air Refueling:

- 3.18.1. Pilots undergoing initial/recurrency training in air refueling will not refuel with a student boom operator (does not apply to KC-10).
- 3.18.2. Pilots will not attempt a night hook-up if slipway lights are inoperative unless refueling is necessary to safely complete the mission.
- 3.18.3. During IMC or night tanker rendezvous, receivers will maintain 1,000 feet altitude separation and will limit range closure to no less than one mile, prior to visual contact with the tanker(s).
- 3.18.4. (PACAF) Pilots should attempt to confirm post-refueling clearance with ATC prior to departing the air refueling altitude block. If outside radio contact, confirm clearance with ATC as soon as possible.
- 3.18.5. (PACAF) For training missions, pilots will discontinue EMCON 2, 3, 4 procedures during the post air refueling/cell breakup period to verbally confirm safe aircraft separation.
- 3.18.6. (PACAF) Quick Flow air refueling (follow-on receivers positioned closer than the observation position) is not authorized.

3.19. Night Operational Procedures:

- 3.19.1. **Night Ground Operations.** Taxi spacing will be a minimum of 300 feet and the aircraft will taxi on the taxiway centerline. Normally, use the taxi light during all night taxiing. (**EXCEPTION:** When the light might interfere with the vision of the pilot of an aircraft landing or taking off, the taxiing aircraft will come to a stop if the area cannot be visually cleared without the taxi light.)
- 3.19.2. **Night Takeoff.** For formation takeoffs, flight/element leaders will turn the anti-collision strobes OFF and position lights BRIGHT (DIM as desired) STEADY when reaching the run-up position on the runway. At the flight leader's direction wingmen may leave anti-collision strobes OFF until brakes release subsequently turning the anti-collision strobes ON and position lights BRIGHT--STEADY for takeoff. The flight/element lead may direct wingmen to turn or leave the strobes OFF anytime the lights cause distraction. All aircraft will turn formation lights ON. During a night formation takeoff, call brake release and configuration changes over the radio. Following takeoff, each aircraft/element will climb on runway heading to 1,000 feet AGL and accelerate to 200 KIAS before initiating turns, except where departure instructions/local procedures/obstructions specifically preclude compliance.
- 3.19.3. **Night Join-up.** Weather criteria for night join-up underneath a ceiling is 1,500 feet and 3 miles. Accomplish join-up/rejoin at or above 1,000 feet AGL. During the rejoin, wingmen will cross check their altimeter to ensure they remain at least 1,000 feet AGL. After join up, the anti-collision strobes will be OFF and position lights will be BRIGHT (DIM if necessary) STEADY for all except the last aircraft. The last aircraft will keep the anti-collision strobe ON and position lights BRIGHT STEADY unless otherwise directed by the flight lead.
- 3.19.4. **Night Formation Procedures.** Refer to AFTTP 3-3V3 (formerly MCH 11-A/OA10V5).
 - 3.19.4.1. (Non-NVG equipped.) When in positions other than fingertip or route, maintain aircraft spacing primarily by instruments (radial/DME or Air to Air TACAN) and/or timing, with visual reference secondary. If unable to ensure aircraft spacing, then establish altitude separation (minimum of 1,000 feet). At all times, pilots will cross-check instruments to ensure ground clearance.

3.19.4.2. Change of lead or wing positions must be accomplished at or above 1,500 feet AGL, unless established on radar downwind. Lead and position changes will be called over the radio and should be initiated from stabilized, wings-level attitude.

3.19.5. **Night Fingertip Position.** Fly night fingertip formation IAW AFTTP 3-3V3 (formerly MCH 11-A/OA10V5). Ensure wingtip clearance is maintained at all times.

3.19.6. **Night Breakup.** Prior to a night formation breakup, the flight leader will confirm position and transmit altitude, airspeed, attitude, altimeter setting and heading. Wingmen will acknowledge confirm good navigational aids.

3.19.7. **Night Landing.** Normally accomplish landings from an instrument straight-in approach. Refer to AFI 11-206 as supplemented for specific procedures.

3.19.7.1. Only perform night formation landings when required to safely recover of the aircraft.

3.20. Night Vision Goggles (NVG) Procedures:

3.20.1. **Published Guidance.** USAF/MAJCOM guidance (including AFI 11-202V3 and AFI 11-214) outlines NVG procedures. Additionally:

3.20.1.1. NVGs will only be worn in flight by NVG qualified pilots or by upgrading pilots with a qualified NVG IP in the flight.

3.20.1.2. Fly with NVGs only in MAJCOM-approved NVG compatible lighted cockpits. Permanently modified NVG compatible cockpits that have a degraded light source may be used for NVG missions IAW AFI 11-2A/OA-10V1; AFI 11-2A/OA-10V3, paragraph 3.20.10.; Attachment 17 and Attachment 18 to this volume; and the A/OA-10 NVG Upgrade and Continuation Training Program message.

3.20.1.3. NVG sorties require an operational Ground Collision Avoidance System (GCAS) system.

3.20.1.4. All flight members will make a radio call when going "goggles on" or "goggles off" and only one flight member will don/doff goggles at a time.

3.20.1.5. Attachment 16, Attachment 17, and Attachment 18 to this volume outline MAJCOM-approved minimum checklist items for NVG cockpit set-up and modification procedures.

3.20.2. **Preflight Test.** NVGs must be preflight tested and adjusted for the individual pilot in a unit eyelane or equivalent tester prior to NVG operations. Preflight test time should allow sufficient time to fix problems and step at the prebriefed step time.

3.20.3. **Takeoff and Landing.** Do not wear NVGs during takeoff or landing. Do not don NVGs until at least 2,000 feet AGL or Minimum Safe Altitude (MSA) (whichever is higher) in climbing or level flight. In all cases, remove NVGs a minimum of 5 minutes prior to landing.

3.20.4. Illumination Levels:

3.20.4.1. High Illumination is defined as a minimum of 2.2 millilux illumination derived from natural or artificial sources. This roughly equates to a 20% moon disk at an elevation of 30 degrees or higher. If weather or other conditions reduce actual in-flight illumination below 2.2 millilux, low illumination procedures will be followed.

3.20.4.2. Low Illumination is defined as less than 2.2 millilux.

3.20.4.3. Even when illumination levels are forecast, weather or other conditions may cause actual illumination levels to be higher or lower than expected. In flight, pilots must estimate whether actual in-flight illumination levels are High or Low, and determine if the existing conditions provide sufficient NVG performance to accomplish the planned mission and/or events. Pilots will comply with High or Low illumination procedures/restrictions contained here and in AFI 11-214.

3.20.5. **NVG Minimum Altitudes.** Minimum altitudes for NVG operations are based on illumination levels, in-flight visibility, and the pilot's NVG qualification.

3.20.5.1. The minimum altitude for all NVG upgrade sorties, familiarization sorties/events, sorties flown under low illumination levels, or sorties flown when in-flight visibility is less than 5 miles is the minimum safe altitude (MSA), as defined in paragraph 3.17.12., or IAW AFI 11-214, whichever is higher.

3.20.5.2. The minimum altitude for all other NVG sorties flown under high illumination levels and with at least 5 miles in-flight visibility is IAW AFI 11-214 and MAJCOM supplements to AFI 11-214.

3.20.6. **Tanker Rejoin.** NVGs may be worn for night tanker rejoins, but will be raised to the up and stowed position or removed no later than 1 NM prior to the observation or precontact position.

3.20.7. **Close Formation.** Wingmen wearing NVGs will fly no closer than route formation.

3.20.8. **Weather Restriction.** MAJCOM established night weather restrictions apply. Pilots must be ready to transition to instruments and execute appropriate lost wingman or route abort procedures in the event they inadvertently enter the weather. Under certain IMC or marginal VFR conditions, NVGs may allow pilots to maintain visual references with relation to the ground, the horizon, other aircraft, etc. However, while wearing NVGs pilots must still comply with published VFR cloud clearance and visibility minimums, have an IFR clearance prior to entering IMC, and follow all IFR procedures while in IMC.

3.20.8.1. (PACAF) NVG VFR cloud clearances and weather minimums are: 2000 feet above or below clouds, 1 NM horizontal clearance, and 3 NM in-flight visibility with a discernible horizon, or IAW AFI 11-214 or AFI 11-202V3, whichever is more restrictive.

3.20.9. **Weapons Delivery:**

3.20.9.1. Range weather restrictions and minimum altitudes during weapons delivery passes are IAW AFI 11-214. Minimum altitudes during night surface attack operations are IAW AFI 11-214 restrictions, the pilot's NVG qualification minimum altitude, and the minimum altitude allowed by the actual illumination level, whichever is higher.

3.20.9.2. On Class A ranges, NVG qualified pilots, with the concurrence of the Range Control Officer (RCO), are allowed to choose external aircraft lighting settings that maximize training, minimize interference with NVGs, and still allow the RCO to safely monitor the aircraft. Depending on the lighting conditions and RCO equipment, this could involve normal, reduced, covert or blacked-out lighting IAW AFI 11-214.

3.20.9.3. NVG qualified pilots may conduct normal, reduced, covert or blacked-out lighting weapons deliveries IAW AFI 11-214 on ranges which do not require RCO control. However, when working with a Ground Forward Air Controller (GFAC) or Air Forward Air Controller

(AFAC), pilots, with GFAC/AFAC concurrence, should choose external lighting settings that safely permit final control.

3.20.9.4. During all range sorties for upgrading NVG pilots (basic NVG upgrade), covert or blacked-out lighting weapons deliveries may only be conducted dry.

3.20.10. Aircraft Modifications:

3.20.10.1. NVG training may be conducted in modified aircraft that have the following Night Vision Imaging System (NVIS) modified components: ADI, HSI, altimeter, airspeed indicator, VVI, standby ADI, engine instruments (APU instruments N/R), hydraulic gauges, fuel gage, armament control panel (ACP), HUD control panel, option select panel (LASTE) and remote frequency indicator (RFI). NVG training may also be conducted in modified aircraft that have a non-NVIS ADI, HSI, altimeter, airspeed indicator, VVI, fuel gauge or RFI if NVIS compatible instrument filters are installed. [Attachment 10](#) and [Attachment 11](#) for cockpit setup and training limitations. (USAFE: See [Attachment 17](#).)

3.20.10.2. Training in modified cockpits that do not meet the conditions in paragraph [3.20.10.1](#) above will be limited.

3.20.10.3. In unmodified aircraft, training will be limited to cadre IPs (cadre pilots for AFRC) flying familiarization sorties/events.

3.20.10.4. **Interim Cockpit Lighting Solutions.** Pilots will only use approved MAJCOM attachments 10 and 11, Appendix B, of the A/OA-10 NVG Transition Manual, and MAJCOM-approved procedures/equipment for interim cockpit lighting setup.

3.20.10.5. Pilots must not become over confident in the capabilities of NVGs. Many things can cause a pilot to lose outside visual references. Some examples are entering the weather (intentionally or inadvertently), NVG battery failure, flight into smoke or dust, flight into a shadowed area, sudden illumination of an incompatible light source inside or outside of the cockpit, etc. Pilots must ensure primary and secondary flight instruments are sufficiently illuminated to allow transition to instruments if outside visual references are lost.

3.21. Fuel Requirements:

3.21.1. **Joker Fuel.** A pre-briefed fuel needed to terminate an event and proceed with the remainder of the mission.

3.21.2. **Bingo Fuel.** A pre-briefed fuel state that allows the aircraft to return to the base of intended landing or alternate, if required, using preplanned recovery parameters and arriving with normal recovery fuel as defined below.

3.21.3. **Normal Recovery Fuel.** The fuel on initial or at the final approach fix (FAF) at the base of intended landing or alternate. Establish fuel quantity locally or 1,500 pounds, whichever is higher.

3.21.4. **Minimum Fuel.** Declared whenever it becomes apparent that an aircraft will enter initial or start an instrument final approach at the base of intended landing, or alternate if required, with 1,200 pounds or less (or as established locally), or when either the Left or Right Main Fuel Low light illuminates, whichever occurs first.

3.21.5. **Emergency Fuel.** Declared whenever it becomes apparent that an aircraft will enter initial or start an instrument final approach at the base of intended landing, or alternate if required, with 800 pounds or less, or 400 pounds in either the left or right main system, whichever occurs first.

3.22. Approaches and Landings:

3.22.1. Minimum pattern and touchdown spacing between similar landing aircraft are 3,000 feet (e.g., A/OA-10 behind A/OA-10), 6,000 feet for dissimilar aircraft (e.g., A/OA-10 behind F-15) or as directed at the landing base, whichever is higher. Increase spacing whenever anticipating wake turbulence.

3.22.2. The desired touchdown point for a VFR approach is 500 feet past the runway threshold, or the glidepath interception point for a precision approach. When local procedures or unique runway surface conditions require landing beyond a given point on the runway, adjust the desired touchdown point accordingly.

3.22.3. Landing Restrictions:

3.22.3.1. When the computed landing roll exceeds 80 percent of the available runway, land at an alternate if possible.

3.22.3.2. When the RCR at the base of intended landing is less than 12 (unless specified otherwise by MAJCOM, AFRC or ANG), land at an alternate if possible.

3.22.3.3. Minimum landing RCR is 12. Per MAJCOM guidance, OG/CC may waive the minimum RCR, for specified units operating in cold weather locations, but in no case will landing be attempted with an RCR below 8.

3.22.3.3.1. (PACAF) 354 OG/CC may waive the minimum RCR for landing to 8. When the RCR is less than 12 and the crosswind component exceeds the RCR, landings are prohibited.

3.22.3.4. Do not land over any raised web barrier (e.g., MA-1A, 61QS11).

3.22.4. Normally all aircraft will land in the center of the runway and clear to the turnoff side of the runway when speed/conditions permit, unless local conditions dictate otherwise.

3.23. Overhead Traffic Patterns:

3.23.1. Altitude and airspeed will be IAW T.O. 1A-10A-1 or as directed locally.

3.23.2. Overhead patterns may be made with unexpended practice ordnance, WP 2.75 rockets, night illumination flares, 30 mm and unexpended live air-to-air ordnance.

3.23.3. Initiate the break over the touchdown point or as directed.

3.23.4. Execute the break individually in a level 180 degree turn to the downwind leg at minimum intervals of 5 seconds (except IP/SEFE chase or when in tactical formation).

3.23.5. Aircraft will be wings level on final at approximately 300 feet AGL and 1 mile from the planned touchdown point.

3.24. Tactical Overhead Traffic Patterns:

3.24.1. Tactical entry to the overhead traffic pattern is permitted if the following conditions are met:

- 3.24.1.1. Use published overhead pattern altitude and airspeed.
- 3.24.1.2. Locally develop and coordinate with appropriate air traffic control agencies specific procedures.
- 3.24.1.3. Four aircraft are the maximum permitted. Aircraft/elements more than 6,000 feet in trail are considered a separate flight.
- 3.24.1.4. Normally position wingmen opposite the direction of the break.
- 3.24.1.5. Regardless of the formation flown, no aircraft should be offset from the runway in the direction of the break; the intent is to avoid requiring a tighter than normal turn to arrive on normal downwind.
- 3.24.1.6. Fly normal downwind and base position.

3.25. Low Approaches:

- 3.25.1. Observe the following minimum altitudes:
 - 3.25.1.1. Normal single ship slow approaches--so that touchdown does not occur.
 - 3.25.1.2. IP/SEFE chase position--50 feet AGL.
 - 3.25.1.3. Formation low approaches (and non-IP/SEFE chase)--100 feet AGL.
 - 3.25.1.4. Chase aircraft during an emergency--300 feet AGL unless safety or circumstances dictate otherwise.
- 3.25.2. During go-around, remain 500 feet below VFR overhead traffic pattern altitude until crossing the departure end of the runway unless local procedures, missed approach/climb-out procedures, or controller instructions dictate otherwise.

3.26. Closed Traffic Patterns. Initiate the pattern at the departure end of the runway unless directed/cleared otherwise by local procedures or the controlling agency. Minimum airspeed during a closed pattern, prior to configuring, is 150 KIAS. When in formation, a sequential closed may be flown with ATC concurrence, at an interval to ensure proper spacing.

3.27. Formation Approaches and Landings:

3.27.1. General:

- 3.27.1.1. Normally accomplish formation landings from a precision approach. If not, accomplish landing utilizing a published instrument approach or a VFR straight-in approach using the VASI if available. In all cases, the rate of descent should be similar to a normal precision approach.
- 3.27.1.2. A flight leader will lead continuation training formation landings. Upgrading flight leads require an IP/flight lead supervisor in the element.
- 3.27.1.3. When only one aircraft is landing from a formation approach, normally the lead will execute a low approach and the wingman will land. In this event, the wingman will break off for landing as briefed, as cleared by the leader, or in the case of poor positioning, accomplish a low approach.
- 3.27.1.4. Do not perform practice formation approaches above 40,000 pounds gross weight.

3.27.2. Formation Landing Restrictions. Aircraft configuration will be IAW paragraph 3.7.4. Formation landings are prohibited:

3.27.2.1. When the cross wind or gust component exceeds 15 knots.

3.27.2.2. When the runway is reported wet; or ice, slush, or snow are on the runway.

3.27.2.3. If runway width is less than 140 feet.

3.27.2.4. When landing with hung ordnance or unexpended live ordnance (excluding live air-to-air missiles, rockets, night illumination flares and 30mm ammunition).

3.27.2.5. If the weather is less than 500 feet and 1 1/2 miles or a flight member's weather category, whichever is higher.

3.27.3. Lead Procedures. Refer to AFTTP 3-3V3 (formerly MCH 11-A/OA10V5).

3.27.3.1. Establish an approach speed consistent with the heavier aircraft. Approach speed may be adjusted up to 10 KIAS higher than the minimum computed airspeed, depending on turbulence, runway length, runway condition, etc.

3.27.3.2. Position the wingman on the upwind side if the cross wind component exceeds 5 knots.

3.27.3.3. Plan to land near the center of your half of the runway to ensure enough runway is available for the wingman.

3.27.4. Wingman Procedures. Refer to AFTTP 3-3V3 (formerly MCH 11-A/OA10V5).

3.27.4.1. Maintain a minimum of 10 feet lateral wingtip spacing.

3.27.4.2. Cross-check the runway to ensure proper runway alignment.

3.27.4.3. Execute a climbout/missed approach if sufficient runway/aircraft clearance is not available.

3.27.5. Roll-out Procedures. Refer to AFTTP 3-3V3 (formerly MCH 11-A/OA10V5).

3.27.5.1. If the wingman overruns the leader, accept the overrun and maintain aircraft control on the appropriate side of the runway. Do not attempt to reposition behind the leader. The most important consideration is wing tip clearance.

3.28. Chaff/Flare/Smoky Devil Procedures. AFI 11-214 contains basic procedures for employment of Chaff/Flare/Smoky Devils.

3.28.1. Do not arm chaff/flare systems unless in an approved area with the intent to dispense chaff and/or flares.

3.28.2. Minimum employment altitude for Smoky Devils is 500 feet AGL.

3.29. (USAFE) Wind and Sea State Restrictions. Normal flying operations will not be conducted when the surface winds along the intended route of flight exceed 35 knots steady state over land (25 knots over water) or when the sea state exceeds 4 meters wave height. This is not intended to restrict operations when only a small portion of the route is affected. If possible, alter the mission plan to avoid that area. The operations group (OG/CC or equivalent) is the waiver authority, to be exercised only when deemed appropriate.

Chapter 4

INSTRUMENT PROCEDURES

4.1. Approach Category:

4.1.1. The A/OA-10 is Approach Category D. Accomplish missed approach in accordance with the flight manual procedures. Missed approach airspeed is 200 to 220 KIAS.

4.1.2. Approach category C minima may be used to an emergency/divert airfield where no Category D minima is published, provided:

4.1.2.1. A straight-in approach is flown.

4.1.2.2. The aircraft is flown at a computed final approach speed of 140 KIAS or less.

4.1.2.3. Missed approach airspeed is 200 to 210 KIAS.

4.1.3. Missed approach airspeeds are based on 260 TAS or less for Category D approaches and 240 TAS or less for Category C approaches. At high pressure altitudes and temperatures, these true airspeeds may not be compatible with published missed approach airspeeds and the approach should not be flown.

4.1.4. A/OA-10s are approved to use INS for enroute Area Navigation (RNAV). Enroute INS navigation may be used for a period not to exceed 1 1/2 hours between INS updates. An update is defined as establishing a positive position using visual references or TACAN. RNAV approaches have not been adopted for use by the USAF and will not be flown.

4.2. Instrument Trail Departure--General:

4.2.1. The flight leader will notify the appropriate ATC agency when a VMC join-up will not be accomplished due to weather conditions or operational requirements, and coordinate for an appropriate altitude reservation. Formation in-trail departures will comply with instructions for a non-standard formation flight as defined in FLIP. Flight lead should request IFF squawks for wingmen in trail.

4.2.2. Do not sacrifice basic instrument flying when performing secondary trail tasks during trail departures in IMC. Strictly adhere to the briefed climb speeds, power settings, altitudes, headings, and turn points. If task saturation occurs, cease attempts to maintain trail, immediately concentrate on flying the instrument departure, and notify the flight lead.

4.3. Formation Instrument Trail Departure Procedures. Refer to AFTTP 3-3V3 (formerly MCH 11-A/OA10V5).

4.3.1. Use takeoff spacing as briefed by the flight leader, but no less than 20 seconds.

4.3.2. Each aircraft/element will accelerate to 200 KIAS. Climb speed will be 200 KIAS and power setting will be 800 degrees ITT unless specifically briefed otherwise.

4.3.3. Each aircraft/element will climb on takeoff heading to 1,000 feet AGL and accelerate to 200 KIAS before initiating any turns, except when departure instructions specifically preclude compliance.

4.3.4. Each aircraft/element will call passing each 2,000 foot altitude increment (or as briefed) with altitude and heading (or heading passing) until join-up or level off. In addition, each aircraft/element will call initiating any altitude or heading change. Acknowledgments are not required; however, it is imperative that preceding aircraft/elements monitor the radio transmissions and progress of the succeeding aircraft/elements and adhere to the departure route.

4.3.5. Each aircraft/element will maintain the briefed trail takeoff spacing using all available aircraft systems and navigational aids to monitor position.

4.3.6. Each aircraft/element will maintain at least 1,000 feet vertical separation from the preceding aircraft/element during the climb and at level off except in instances where departure instructions specifically preclude compliance. If unable to comply with MEA, the 1,000 foot vertical separation may be reduced to 500 feet.

4.3.7. If unable to accomplish a visual join-up on top or at level off, the flight leader will request 1,000 feet of altitude separation from ATC for each succeeding aircraft/element, providing all aircraft can comply with MEA restrictions.

4.4. Formation Breakup/Spacing Procedures. Formation breakup should not be accomplished in IMC; however, if unavoidable, accomplish the breakup in straight and level flight. Prior to a weather breakup, the flight leader will transmit attitude, airspeed, altitude, altimeter setting, and heading. All wingmen acknowledge the transmission and confirm good navigational aids.

4.5. Formation Penetration:

4.5.1. Formation penetrations are restricted to two aircraft when the weather at the base of intended landing is less than overhead traffic pattern minimums.

4.5.2. If flying a formation landing, the wingman should be positioned on the appropriate wing prior to weather penetration.

4.6. Formation Lead Changes in IMC. In IMC, formation flights will not change lead/wing positions below 1,500 feet AGL or instrument downwind altitude, whichever is lower.

4.7. Use of the Heads-Up Display. The HUD may be used as an additional instrument reference in night/IMC conditions; however, do not use it as the sole instrument reference in these conditions. In addition, do not use the HUD to recover from an unusual attitude or when executing lost wingman procedures except when no other reference is available.

4.8. Simulated Instrument Flight. Logging simulated instrument flight in an A/OA-10 requires a chase aircraft. This does not preclude flying multiple approaches in VMC without a chase; however, in this case the primary emphasis will be on the "See and Avoid" concept. Chase aircraft will be in a position from which they can effectively clear and/or provide assistance. Chase aircraft may move into close formation on final if flying a formation landing and terminating simulated instrument flight.

Chapter 5

AIR-TO-AIR WEAPONS EMPLOYMENT

5.1. General:

5.1.1. AFI 11-214 contains air-to-air procedures to include operations with live ordnance (air-to-air missiles) applicable to all aircraft. The procedures contained in this chapter specify additional procedures or restrictions that are applicable to A/OA-10 operations.

5.1.2. This chapter applies to all missions where the intent is to conduct maneuvers used to defeat aerial attacks or to employ ordnance against airborne fixed wing aircraft or helicopters. Fixed wing air-to-air training should emphasize visual acquisition of threats, maneuvering to negate any attack, mutual support, and forcing the attacker to disengage. Anti-helicopter air-to-air training should emphasize visual search techniques, maneuvers to negate helicopter attacks, aspect and range determination, and weapons selection and employment to kill the threat.

5.1.3. During high-aspect BFM training, a dedicated defender and offender must be clearly identified for each engagement. The offender will have some kind of advantage (power, G available, lead turn advantage at the merge). During upgrade training (MQT/FLUG/IPUG), high-aspect BFM will be conducted IAW the appropriate syllabus.

5.2. Simulated Gun/AIM-9 Employment. Simulated Gun/AIM-9 employment is governed by the following:

5.2.1. Simulated attacks using the gun trigger and AIM-9 pickle button are allowed if the following conditions are met:

5.2.1.1. The gun is PINNED

5.2.1.2. Rounds limit switch is in LIMIT.

5.2.1.3. Rounds limit counter is ZERO.

5.2.1.4. Gun rate switch is SAFE.

5.2.1.5. Cold trigger check is accomplished and acknowledged throughout the flight.

5.2.1.6. Master Arm switch is ARM, SAFE, or CAMERA. (If in SAFE or CAMERA, pickle button initiated AIM-9 employment is inoperative.)

NOTE:

If expendable practice ordnance is aboard the aircraft, check all release modes OFF, no weapons stations selected, fusing SAFE and acknowledged throughout the flight, prior to cold trigger check.

5.2.2. Simulated Gun attacks are allowed when the gun is UNPINNED if the following conditions are met:

5.2.2.1. Gun rate switch is SAFE.

5.2.2.2. Master Arm switch is in SAFE or CAMERA. (Pickle button initiated AIM-9 employment is inoperative.)

5.2.2.3. Cold trigger check is accomplished and acknowledged throughout the flight.

5.2.2.4. Gun trigger is not depressed during attacks.

5.2.3. Attacks using pickle button initiated AIM-9 employment are allowed when the gun is UNPINNED if the following conditions are met:

5.2.3.1. Gun rate switch is SAFE.

5.2.3.2. Master Arm switch is ARM.

5.2.3.3. Cold trigger check is accomplished and acknowledged throughout the flight.

NOTE:

If expendable practice ordnance is aboard the aircraft, check all release modes OFF, no weapons stations selected, fusing SAFE and acknowledged throughout the flight, prior to cold trigger check.

5.2.3.4. Simulated gun attacks are not permitted with Master Arm in the ARM position.

5.3. Maneuvering Limits:

5.3.1. The minimum airspeed during ACBT is 120 KIAS.

5.3.2. Pilots will not maintain an angle of attack (AOA) that triggers the chopped stall warning tone.

5.3.3. The minimum maneuvering airspeed during LOWAT is 240 KIAS for both defensive and Baron offensive maneuvering.

5.3.4. Negative G guns jink out maneuvers are prohibited.

5.3.5. Night Air to Air weapons events will not be accomplished without specific MAJCOM approval.

Chapter 6

AIR-TO-SURFACE WEAPONS EMPLOYMENT

6.1. General. References--AFTTP 3-1 (formerly MCM 3-1), AFTTP 3-3V3 (formerly MCH 11-A/OA10V5), T.O. 1A-10-34-1-1, T.O. 1A-10-34-1-2, T.O. 1A-10-26, and Fighter Weapons School (FWS) Instructional Texts are primary references for fighter weapons employment theory, planning, techniques and analysis. AFI 11-2A/OA-10V1 contains qualification and scoring criteria. AFI 11-214 contains operating and training procedures.

6.2. Weather Minimums. Refer to AFI 11-214. Weather ceiling will be no lower than 1,500 ft AGL.

6.3. Battle Damage/Bomb Checks. If circumstances permit, flight leads will direct a battle damage/bomb check prior to or during RTB. This check is mandatory following the expenditure of live ordnance (including all types of 30mm ammunition). Observe established deconfliction responsibilities and position change procedures. Formation spacing will be no closer than normal fingertip.

6.4. Training Rules:

6.4.1. Refer to AFI 11-214. If airspeed decreases below 210 KIAS in a pop-up attack, abort the maneuver. Base this airspeed on typical training weights and configurations. At heavy gross weight, adjust abort airspeed upward to provide sufficient G and turning room to recover from an adverse flight condition.

6.4.2. Pilots must positively identify the target prior to weapons release. Achieve positive identification by either visually acquiring the target or by confirming target location through valid on-board/off-board cues. These cues include marking rounds, Pave Penny spot, IR Maverick lock-on, IR pointers or other NVG compatible marking devices. Pilots should exercise caution and possess a high level of target situational awareness when relying on a single target cue to confirm target location (e.g., employment at night with a Pave Penny spot alone, in the absence of no other confirming cues).

6.4.2.1. **Pave Penny Procedures.** Pave Penny employment utilizes the concepts of a safety and optimum attack zones.

6.4.2.1.1. The safety zone is a 20 degree fan whose apex is at the target and extends 10 degrees either side of the target-to-laser designator line.

6.4.2.1.2. The optimal attack zone is a 120 degree fan whose apex is at the target and extends to 60 degrees either side of the target-to-laser designator line, excluding the safety zone.

6.4.2.1.3. Pave Penny will not be used as a sole source for target identification. In some situations, laser spots shift from the designated target to the laser source while operating in the optimal attack zone--precluding total reliance on the laser spot.

6.4.2.1.4. Attack heading should avoid the target-to-laser designator safety zone to preclude false target indications.

6.4.3. FTU/MQT Pilots:

6.4.3.1. Will not change targets once roll-in to final is initiated except during two-target strafe.

6.4.3.2. Will not perform element pop-ups. This does not preclude IP chase or tactical formation ingress to the target.

6.4.4. Local operational procedures/directives will specify night spacing techniques and order of night weapons deliveries commensurate with aircraft performance, flight manual restrictions and peculiarities of local range geography and target sets. Procedures should ensure performance of the most demanding events after the pilot is acclimated to night weapons deliveries.

6.5. Live Ordnance Procedures:

6.5.1. Refer to AFI 11-214.

6.5.2. Do not make simulated weapon delivery passes on targets occupied by personnel.

6.5.3. When Ground Controllers are operating on Class B/C ranges, the following procedures apply:

6.5.3.1. All pilots will be familiar with applicable range weapons delivery procedures, appropriate targets and weapons footprints.

6.5.3.2. Ground personnel locations will be briefed and acknowledged by all pilots.

6.5.3.3. Pilots will not expend ordnance if any doubt exists as to the ground personnel or intended target locations.

6.6. Off-Range Simulated Weapons Employment:

6.6.1. AFI 11-214 and the following apply:

6.6.1.1. Do not conduct off-range simulated weapons employment with hung ordnance aboard the aircraft.

6.6.1.2. Do not conduct off-range simulated weapons employment with live ordnance (except 30 mm) aboard the aircraft.

6.6.2. When 30mm ammunition is loaded, pilots will not actuate the gun trigger unless the following conditions are met:

6.6.2.1. Gun is pinned.

6.6.2.2. Rounds limit switch is in LIMIT.

6.6.2.3. Rounds limit counter is zero.

6.6.2.4. Gun rate switch is SAFE.

6.6.2.5. Cold trigger check is accomplished and acknowledged throughout the flight.

6.6.2.6. Master Arm switch is in the SAFE or CAMERA position. **EXCEPTION:** The Master Arm switch may be placed in the Arm position only on ranges utilizing the Air Combat Maneuvering Instrumentation (ACMI) interface system.

6.6.3. Pilots will not actuate the pickle button when expendable training ordnance (except 30 mm) is aboard the aircraft. In addition, the Master Arm switch will be in the SAFE or CAMERA position.

6.6.4. Off-range TGM-65 Maverick attacks may be conducted with the Master Arm switch in ARM, utilizing the pickle button, when observing the following conditions:

6.6.4.1. No expendable practice ordnance (except 30 mm) is aboard the aircraft.

6.6.4.2. Confirm E/O in the appropriate stores loading display window and only the TGM station is selected.

6.6.4.3. The MECH FUZING and GUN RATE switches are SAFE.

6.6.4.4. Complete appropriate weapons delivery checklist items.

6.6.4.5. NOTE: For off-range Maverick attacks, the desired aircraft configuration is not to have expendable practice ordnance (except 30 mm) aboard the aircraft.

6.6.4.6. (ANG) Minimum altitude for ANG Maverick missile employment training is 500 feet AGL for day operations. Night Maverick employment is limited to 2000 feet AGL.

6.6.5. (USAFE) Refer to AFI 11-2A/OA-10V1 and USAFER 55-45, *USAFE Range Procedures*. The minimum recovery altitude for simulated off-range releases will be according to this volume, national rules, or pilot low altitude category, whichever is higher.

6.7. Joint Air Attack Team (JAAT):

6.7.1. **References.** AFTTP 3-1 (formerly MCM 3-1) is the primary references for JAAT procedures, and techniques. (ACC/AFRC/ANG) Also use ACCR 55-26, *Joint Live Fire Training. Operations Fighter/Bomber/Reconnaissance/Airlift/Special Operations*.

6.7.2. **Aircraft/Helicopter Separation.** Helicopters normally operate from surface to treetop, Nap of the Earth (NOE). If helicopters are unable to hover in ground effect, or operate NOE, ensure altitude separation through one or both of the following methods:

6.7.2.1. Establishing altitude blocks with at least 100 feet separation between the top of the helicopter block and the bottom of the A-10 block.

6.7.2.2. Employing attack routes/sectors or timing procedures that ensure deconfliction.

6.7.3. **Training Rules.** Normal air-to-surface training rules apply. In addition, anytime uncertainty about helicopter positioning or a flight path conflict arises, terminate attacks by a Knock-It-Off call. A-10s will climb immediately and maneuver to avoid any conflict.

6.7.4. **Radio Frequencies.** All participants must monitor one common frequency.

6.7.5. Briefings:

6.7.5.1. Maximum training is achieved when helicopter and A-10 pilots operate from the same location. Operations should be from an airfield that will allow direct face-to-face contact between all participants (helicopter pilots, FACs, and A-10 pilots) for flight briefings/debriefings.

6.7.5.2. As a minimum, one JAAT qualified A-10 flight lead from the participating unit will interface with the helicopter unit. This interface will include a review of training objectives, training constraints (airspace/pilot limitations, etc.), training rules, and joint/combined operating procedures. Then brief all participating aircrews on the training rules, objectives, etc.

6.7.5.3. Accomplish mass briefings/debriefings prior to and following JAAT exercises whenever possible.

6.7.5.4. When face-to-face flight briefings are not feasible, accomplish telephone briefings.

6.8. Search and Rescue Training:

6.8.1. AFTTP 3-1 (formerly MCM 3-1) is the primary reference for wartime SAR procedures, techniques and planning. For peacetime SAR considerations, see paragraph [7.12.](#) of this volume.

6.9. (USAFE) Forward Air Controller (FAC). For weapons employment with FAC, or when acting as a FAC, refer to ATP-27B, *Offensive Air Support Operations*, and AAFCEM 80-2, *Offensive Air Support Manual*, for procedures used by North Atlantic Treaty Organization (NATO) forces.

Chapter 7

ABNORMAL OPERATING PROCEDURES

7.1. General. This chapter contains procedures to follow when other than normal operations occur. They do not, however, replace or supersede procedures contained in the flight manual or the use of sound judgment.

7.1.1. Accept no aircraft for flight with a malfunction addressed in the emergency/abnormal procedures section of the flight manual (except INS, LASTE, or IFF Mode 4 failure) until completing appropriate corrective actions.

7.1.2. Do not taxi aircraft with malfunctions that affect the nosewheel steering or brake systems.

7.1.3. After isolating and/or correcting a malfunctioning system, do not use that system again unless its use in a degraded mode is essential for recovery. Do not conduct in-flight trouble shooting after completing flight manual emergency procedures.

7.1.4. When a fuel imbalance is greater than T.O. 1A-10A-1 limits, terminate tactical maneuvering and investigate. If the fuel imbalance was caused by a slow feeding tank that can be corrected, vice a fuel system failure, the mission may continue IAW T.O. 1A-10A-1 guidance. Terminate the mission if fuel imbalance cannot be corrected. Instruments, medium altitude navigation, deployment missions, and level weapons deliveries are authorized profiles to reduce gross weight.

7.2. Ground Aborts:

7.2.1. When a flight member aborts prior to takeoff, the flight leader will normally realign (or align as briefed) flight positions to maintain a numerical call sign sequence. Flight leaders will advise the appropriate agencies of such changes.

7.2.2. A flight of two or more aircraft with only one designated flight lead in the formation must either sympathetically abort or proceed on a pre-briefed single-ship mission should the flight lead abort.

7.2.3. Pilots who do not takeoff with the flight may join the flight at a briefed rendezvous point prior to a tactical event, or may fly a briefed alternate single-ship mission. FTU students may also follow this procedure if allowed by the appropriate syllabus, and approved by the squadron commander or operations officer. If accomplishing a join-up on an air-to-ground range, terminate all events until the joining aircraft has achieved proper spacing.

7.3. Takeoff Aborts:

7.3.1. Prior to flight, every member of the flight will review and understand takeoff data. Place particular emphasis on takeoff and abort factors during abnormal situations such as short/wet runway, heavy gross weights, and abort sequence in formation flights.

7.3.2. If an abort occurs during takeoff roll, clear to the appropriate side of the runway as expeditiously as possible based on position within the element. If this is not feasible because of possible barrier engagement, clear straight ahead. As soon as possible, give call sign and state intentions. Following aircraft will alter takeoff roll to ensure clearance or will abort takeoff if unable to maintain adequate clearance.

7.3.3. Anytime an aircraft experiences a high speed abort and hot brakes are suspected:

7.3.3.1. Declare a ground emergency.

7.3.3.2. Taxi the aircraft to the designated hot brake area and perform hot brake procedures.

7.4. Air Aborts:

7.4.1. If an abort occurs after takeoff, all aircraft will maintain their original numerical call sign.

7.4.2. The pilot of an aborting aircraft will advise the flight leader of the conditions necessitating the abort, intentions and assistance required.

7.4.3. If the flight leader aborts, the designated deputy leader will assume command of the flight.

7.4.4. Escort aborting aircraft with an emergency condition to the field of intended landing. When other than an emergency condition exists, the flight leader will determine if the aborting aircraft requires an escort.

7.4.5. Abort the mission, regardless of apparent damage or subsequent normal operation, for any of the following:

7.4.5.1. Birdstrike/foreign object damage.

7.4.5.2. Over-G. The aircraft will land as soon as practical out of a straight-in approach.

7.4.5.3. Flight control system anomalies. Declare an emergency, even if the malfunction appears corrected.

7.4.5.4. Engine flameout/stagnation or shutdown. This applies even if a successful restart is accomplished. Exception: Intentional shutdowns for Functional Check Flights (FCFs).

7.5. Radio Failure:

7.5.1. **General.** Individual aircraft experiencing radio failure will comply with procedures outlined in FLIP, AFI 11-205, AFI 11-202V3, this volume, and local directives.

7.5.2. Formation:

7.5.2.1. Flight members who experience total radio failure while in close or route formation will maneuver within close/route parameters to attract the attention of another flight member and give the appropriate visual signals. Terminate the mission as soon as practical and lead the NORDO aircraft to the base of intended landing or a divert base. Perform a formation approach to a drop-off on final unless safety, fuel, weather, or other considerations dictate otherwise.

7.5.2.2. If flying other than close/route formation when radio failure occurs, the NORDO aircraft should attempt to rejoin to a route position on another flight member. The joining/wing aircraft is responsible for deconfliction until the other flight member acknowledges his presence by a wing rock, signifying clearance to join. Once joined, the NORDO aircraft will give the appropriate visual signals. If prebriefed, the NORDO aircraft may proceed to a rendezvous point and hold. If no one has rejoined prior to reaching BINGO fuel, the NORDO aircraft should proceed to the base of intended landing or a divert base IAW paragraph 7.5.1. above. Aircraft experiencing any difficulty/emergency in addition to NORDO will proceed as required by the situation.

7.5.3. Surface Attack NORDO Procedures for Class A/Manned Class B Ranges:

7.5.3.1. Attempt contact with the RCO on the appropriate backup frequency.

7.5.3.2. If unable to re-establish contact, make a pass by the range control tower on the attack heading while rocking wings, and turn in the direction of traffic. The flight leader will either rejoin on the NORDO aircraft, or direct another flight member to rejoin on the NORDO aircraft, in order to escort the NORDO aircraft to a recovery base.

7.5.3.3. If the NORDO aircraft has an emergency, make a pass by the range control tower, if practical, on the attack heading while rocking wings, turn opposite the direction of traffic, and proceed to a recovery base. The flight leader will either rejoin on the NORDO aircraft, or direct another flight member to rejoin on the NORDO aircraft, in order to escort the emergency aircraft.

7.5.3.4. If the RCO experiences radio failure, the flight will hold high and maintain spacing while attempting contact on primary and backup frequencies.

7.5.3.5. If radio failure occurs and circumstances preclude landing with unexpended ordnance, safe jettison of ordnance may be accomplished provided the following conditions are met:

7.5.3.5.1. The NORDO aircraft joins on another flight member that has radio contact with the RCO and the remainder of the flight.

7.5.3.5.2. Stores jettison visual signals specified in AFI 11-205 are relayed to the NORDO aircraft to initiate jettison.

7.5.4. Surface Attack NORDO Procedures for Unmanned Class B and Class C Ranges:

7.5.4.1. Make a "high and dry" pass on the target, if possible, while rocking wings.

7.5.4.2. The leader will either rejoin the flight in sequence and recover, or direct another flight member to escort the NORDO aircraft to a recovery base.

7.5.4.3. If the NORDO has an emergency, he will, if practical, make a pass on the target, rocking wings, turn opposite direction of traffic, and proceed to a recovery base. The flight leader will either rejoin on the NORDO aircraft, or direct a flight member to rejoin on the NORDO aircraft, in order to escort the emergency aircraft.

7.5.5. NORDO Recovery:

7.5.5.1. The procedures in AFI 11-205 and FLIP apply.

7.5.5.2. If flying a straight-in approach and a go-around becomes necessary, the chase will go-around, pass the NORDO aircraft and rock his wings.

7.5.5.3. The NORDO aircraft will go-around if the situation allows. If the NORDO aircraft is in formation as a wingman, the leader will initiate a gentle turn into the wingman and begin the go-around.

7.6. Severe Weather Penetration:

7.6.1. Do not attempt flight through severe weather. However, if unavoidable, obtain separate clearances prior to severe weather penetration. If not feasible, flights may assume an in-trail formation with a minimum of 1 NM separation between aircraft/elements. Obtain ATC clearance for a non-standard formation.

7.7. Lost Wingman Procedures. In any lost wingman situation, immediate separation of aircraft is essential. Upon losing sight of the leader or unable to maintain formation due to spatial disorientation (SD), the wingman will simultaneously execute the applicable lost wingman procedures while transitioning to instruments and inform the flight lead. Refer to paragraph 7.8. for specific SD considerations. Smooth application of control inputs is imperative to minimize the effects of SD. Permission from the flight lead is required to rejoin the flight once lost wingman procedures have been executed.

7.7.1. Two- or Three-Ship Flights:

7.7.1.1. Wings-Level Flight. In wings-level flight (climb, descent, or straight and level) simultaneously inform the leader and turn away using 15 degrees of bank for 15 seconds, then resume heading and obtain separate clearance.

7.7.1.2. Turns:

7.7.1.2.1. Outside the Turn. Reverse the direction of turn using 15 degrees of bank for 15 seconds and inform the leader. Continue straight ahead to ensure separation prior to resuming the turn. Obtain a separate clearance.

7.7.1.2.2. Inside the Turn. Momentarily reduce power to ensure nose-tail separation, and inform the flight leader to roll out of the turn. Maintain angle of bank to ensure lateral separation and obtain separate clearance. Once assured separation, the leader may resume turn.

NOTE:

If in three-ship echelon, refer to four-ship lost wingman procedures.

7.7.1.3. Precision/Non-Precision Final. The wingman will momentarily turn away to ensure separation, inform lead, and commence the published missed approach procedure while obtaining a separate clearance from approach control.

7.7.1.4. Missed Approach. The wingman will momentarily turn away to ensure separation, inform lead, and continue the published or assigned missed approach procedure while climbing to 500 feet above missed approach altitude. Obtain a separate clearance from approach control.

7.7.2. Four-Ship Flights. If only one aircraft in the flight becomes separated, the previous procedures will provide safe separation. Since it is impossible for number 4 to immediately ascertain that number 3 still has visual contact with the leader, it is imperative that initial action of number 4's be based on the assumption that number 3 has also become separated. Number 2 and 3 will follow the procedures outlined above. Number 4 will follow the appropriate procedure listed below:

7.7.2.1. Wings-Level Flight. Simultaneously inform the leader and turn away using 30 degrees of bank for 30 seconds, then resume heading and obtain separate clearance.

7.7.2.2. Turns:

7.7.2.2.1. Outside the Turn. Reverse direction of turn using 30 degrees of bank for 30 seconds to ensure separation from lead and number 3 and obtain separate clearance.

7.7.2.2.2. Inside the Turn. Momentarily reduce power to ensure nose-tail separation and increase bank angle by 15 degrees. Inform the leader to roll out. Obtain separate clearance. Leader will resume turn only when separation is ensured.

7.7.3. **Flight Leader.** The flight leader should acknowledge the lost wingman's radio call and transmit attitude, heading, altitude, airspeed and other parameters as appropriate. Wingman will base lost wingman procedure on the flight lead's transmitted parameters (use caution observing published terrain clearance limits).

7.7.3.1. Flight leads will be directive to ensure aircraft separation as required by the situation.

7.7.4. **Wingman.** If a wingman becomes separated and any aircraft experiences radio failure, the aircraft with the operational radio will obtain a separate clearance. The NORDO aircraft will turn the IFF/SIF to the appropriate code listed in the Flight Information Handbook or IAW national rules while proceeding with the previous clearance. If an emergency situation arises along with radio failure, turn the IFF/SIF to emergency (7700) for the remainder of the flight.

7.7.5. **Practice.** Practice lost wingman procedures only in VMC.

7.7.6. **Join-up from Lost Wingman.** With flight lead permission, wingmen may join if weather conditions permit a visual join-up.

7.8. Spatial Disorientation. Conditions which prevent a clear visual horizon or increase pilot tasking are conducive to SD. To prevent SD, the pilot will make a conscious attempt to increase instrument cross-check rate. When SD symptoms are detected, take the following steps until symptoms abate:

7.8.1. Single Ship:

7.8.1.1. Concentrate on flying basic instruments with frequent reference to the attitude indicator. Use heads-down instruments. Defer non-essential cockpit tasks.

7.8.1.2. If symptoms persist, bring aircraft to straight and level flight with reference to the attitude indicator and maintain straight and level flight, terrain permitting, until symptoms abate, (usually 30 to 60 seconds), conditions permitting.

7.8.1.3. If necessary, declare an emergency and advise ATC.

7.8.1.4. It is possible for SD to proceed to the point where the pilot is unable to see, interpret, or process information from the flight instruments. Aircraft control in such a situation is impossible. A pilot must recognize when physiological/psychological limits have been exceeded and be prepared to abandon the aircraft.

7.8.2. Formation Lead:

7.8.2.1. A flight lead with SD will advise wingmen that lead has SD and will comply with procedures in paragraph 7.8.1. above.

7.8.2.2. If possible, wingmen should confirm attitude and provide verbal feedback to lead.

7.8.2.3. If symptoms persist, terminate the mission and recover the flight by the simplest and safest means possible.

7.8.3. Formation Wingman:

7.8.3.1. Wingman will advise lead when disorientation makes it difficult to maintain position.

7.8.3.2. Lead will advise wingman of aircraft attitude, altitude, heading, and airspeed.

7.8.3.3. If symptoms persist, lead will establish straight and level flight for 30 to 60 seconds, conditions permitting.

7.8.3.4. If the above procedures are not effective, lead should consider passing the lead to the wingman, provided the leader will be able to maintain situation awareness from a chase position. Transfer lead while in straight and level flight. Once assuming the lead, maintain straight and level flight for 60 seconds. If necessary, terminate the tactical mission and recover by the simplest and safest means possible.

7.8.4. **Greater Than Two-Ship Formation.** Lead should separate the flight into elements to more effectively handle a wingman with persistent SD symptoms. Establish straight and level flight IAW paragraph 4.4. (Formation Breakup). The element with the SD pilot will remain straight and level while the other element separates from the flight.

7.9. Armament System Malfunctions:

7.9.1. Inadvertent Release:

7.9.1.1. Record switch positions at the time of inadvertent release and provide to armament and safety personnel. Record the impact point, if known.

7.9.1.2. Check armament switches safe and do not attempt further release in any mode. Treat remaining stores as hung ordnance and obtain a chase aircraft during RTB, if practical.

7.9.1.3. If remaining stores present a recovery hazard, jettison in a suitable area on a single pass, if practical.

7.9.2. **Failure to Release/Hung Ordnance.** If ordnance fails to release when all appropriate switches are set, proceed as follows:

7.9.2.1. **Live Ordnance.** For hung live ordnance or an aircraft malfunction that precludes further live weapons delivery, refer to T.O. 1A-10A-34-1-1. The following procedures also apply:

7.9.2.1.1. Note all release and fusing switches, then safe.

7.9.2.1.2. Attempt to jettison store(s) using jettison or alternate delivery mode. Consider attempting to jettison the rack if ordnance is unsecure or unable to determine security.

7.9.2.1.3. If ordnance remains on the aircraft, follow the hung ordnance recovery procedures.

7.9.2.2. Practice/Inert Ordnance:

7.9.2.2.1. Re-check switch positions and make an additional attempt to expend. If no release occurs, select another mode of delivery in an attempt to expend.

7.9.2.2.2. If the secondary release mode fails, ordnance from other stations/dispensers may be released providing the aircraft will remain within symmetrical load limits.

7.9.2.2.3. If remaining stores present a recovery hazard, jettison in a suitable area on a single pass, if practical.

7.9.2.2.4. If ordnance remains on the aircraft, follow the hung ordnance recovery procedures.

7.9.3. Hang Fire/Misfire--General:

7.9.3.1. A missile that fires but fails to depart the aircraft is a hangfire. If this occurs, the chase pilot should closely observe and safety check the missile.

7.9.3.2. A missile that fails to fire when all appropriate switches were selected is a misfire. If this occurs, safe the Master Arm switch and follow the hung ordnance recovery procedures.

7.9.3.3. T.O. 1A-10A-34-1-1 contains hangfire/misfire procedures for specific ordnance types.

7.9.4. **Gun Unsafe.** Refer to T.O. 1A-10A-34-1-1. The following procedures also apply:

7.9.4.1. If the gun unsafe light is accompanied by any unusual noise/vibration, or any other indication of gun/aircraft damage, the pilot will declare an emergency.

7.9.4.2. Accomplish gear lowering over an unpopulated area.

7.9.5. **Recovery with Weapons Malfunction/Hung Ordnance:**

7.9.5.1. If practical, visually inspect the aircraft for damage.

7.9.5.2. Declare an emergency (not required for hung practice/inert ordnance or rockets).

7.9.5.3. Obtain a chase aircraft, if available, and avoid populated areas and trail formations.

7.9.5.4. Land from a straight-in approach, or IAW local hung ordnance procedures.

7.9.6. **Miscellaneous Procedures:**

7.9.6.1. Pilots will not attempt to expend ordnance using a delivery system with a known weapons release malfunction.

7.9.6.2. When abnormal missile launch or erratic missile flight is noted after launch, another aircraft will visually inspect the launching aircraft (if possible) to determine if any damage has occurred.

7.10. In-flight Practice of Emergency Procedures:

7.10.1. **Simulated Emergency Procedures--Definition.** Any procedure that produces an effect that would closely parallel the actual emergency such as retarding the throttle to idle and disengaging the SAS to simulate a single engine situation.

7.10.2. **Emergency Practice:**

7.10.2.1. Accomplish all practice and/or training related to aborted takeoffs in the Cockpit Familiarization Trainer (CFT), or a static aircraft (if trainers unavailable).

7.10.2.2. Practice in-flight engine shutdown is prohibited (except during FCF profiles).

7.10.2.3. While in flight, simulated loss of both engines is prohibited.

7.10.3. **Simulated Single Engine (SSE) Approach/ Landing:**

7.10.3.1. Do not initiate simulated single engine failure below 1,000 feet AGL and terminate if the aircraft descends below 800 feet AGL prior to base leg or the airspeed drops below computed final approach speed for the aircraft configuration.

7.10.3.2. Follow procedures in T.O. 1A-10A-1 for emergency landing patterns and actual single engine approaches as appropriate for the simulated engine failure situation. Pilots will engage anti-skid prior to landing.

7.10.3.3. Pilots will plan approaches to avoid turns into the simulated dead engine when practical. If turns into the simulated dead engine are necessary, plan patterns to minimize bank angle.

7.10.3.4. IQT or MQT pilots will not perform simulated single engine full stop landings unless chased by an IP.

7.10.3.5. (ANG/AFRC/USAFE) Simulated single engine approaches not terminating in a full stop landing will utilize both engines during go-around, except single engine training conducted above 5,000 feet AGL or as discussed in 7.10.4.

7.10.3.6. SSE approaches will be discontinued if the airspeed decreases below computed single engine final approach speed.

7.10.4. Simulated Single Engine (SSE) Go Around Training:

7.10.4.1. Descents below 300 feet AGL are permitted, provided the approach terminates in a full stop landing, or the go-around is performed with both engines.

7.10.4.2. (ACC/PACAF) Simulated Single Engine (SSE) go arounds from SSE approaches may be practiced at low altitude provided the event is chased by an CMR/BMC pilot (inexperienced pilots require IP/Squadron Supervisor chase the first time a SSE is flown at low altitude), and the aircraft does not descend below 300 feet AGL.

7.10.4.3. (ACC/PACAF) Low altitude SSE go-around will be specifically planned and briefed prior to flight. The briefing should include a review of differences between actual versus SSE go-around. Emphasis during the go-around will be on maintaining proper airspeed and rudder application to ensure directional control.

7.10.4.4. (ACC/PACAF) SSE go-around will be discontinued if airspeed decreases below computed single engine go-around speed.

7.10.5. Emergency Landing Pattern Practice. Practice of emergency landing patterns at active airfields is authorized provided that:

7.10.5.1. Adequate crash rescue and air traffic control facilities are available and in operation.

7.10.5.2. The pilot is CMR/BMC. MQT pilots may practice emergency landing patterns when chased by a qualified flight lead. IQT pilots must be chased by an IP.

7.10.5.3. Radio calls at pattern entry and as directed locally or by the controlling agency include the type emergency being simulated.

7.11. Manual Reversion Approach and Landing. Factors to consider are pilot proficiency, instrument approach facilities, runway conditions, weather at the recovery field, and any accompanying aircraft malfunctions. Controlled bailout is recommended anytime existing conditions may preclude a safe recovery or during single engine operations.

7.11.1. Flying in manual reversion is something that is done infrequently and must be treated accordingly. A thorough review of manual reversion procedures in the Dash-1 and/or Dash-6 will be accomplished before any flights where manual reversion is a mandatory part of the flight profile. Particular attention will be placed on actions to be taken when problems arise with manual reversion flight. The first action must be to revert to the normal flight control mode. If that action does not solve the problem and the aircraft is uncontrollable, then ejection is recommended.

7.11.2. Pilots who fly in manual reversion must be completely aware of the characteristics of, problems associated with, and procedures to use with manual reversion.

7.11.2.1. Other than actual emergencies requiring manual reversion, pilots will only go into manual reversion when on a dedicated FCF, FCF upgrade sortie or FTU upgrade sortie.

7.11.2.2. Aircraft must have less than 350 rounds of 30 mm and a configuration of symmetrically loaded TERS, empty TERS, rocket pods or clean to use manual reversion.

7.11.2.3. If aircraft will not go into Manual Reversion or the pitch trim does not work, return Manual Reversion switch to NORM.

7.12. Search and Rescue (SARCAP) Procedures. In the event an aircraft is lost in flight, actions must begin to locate possible survivors and initiate rescue efforts. It is critical all flight members aggressively pursue location and rescue of downed personnel even though they seem uninjured. Many downed aircrews initially suffer from shock or have delayed reactions to ejection injuries. The following procedures are by no means complete and may require adjustment to meet each unique search and rescue situation. **Chapter 8**, Local Operating Procedures, **8.2.2.6.**, Abnormal Procedures, details specific procedures.

7.12.1. **SQUAWK.** Immediately terminate maneuvering using appropriate Knock-It-Off procedures. Establish a SARCAP commander. Place IFF to EMER to alert ATC or Ground Control Intercept (GCI) of the emergency situation.

7.12.2. **TALK.** Communicate the emergency situation and aircraft/flight intentions immediately to control agencies. Use GUARD frequency if necessary.

7.12.3. **MARK.** Mark the last known position of survivor/crash site using any means available. Use TACAN/INS position, ATC/GCI positioning, or ground references to identify the immediate area for subsequent rescue efforts.

7.12.4. **SEPARATE.** Remain above the last observed parachute altitudes until determining the position of all possible survivors. Deconflict other aircraft in the SARCAP by altitude to preclude midair collision. Establish high/low CAPs as necessary to facilitate communications with other agencies.

7.12.5. **BINGO.** Revise BINGO fuels or recovery bases as required to maintain maximum SARCAP coverage over survivor/crash site. Do not overfly BINGO fuel. Relinquish SARCAP operation to designated rescue forces upon their arrival.

Chapter 8

LOCAL OPERATING PROCEDURES

8.1. Local Operation Procedures. This chapter is reserved for unit local operating procedures. Procedures herein will not be less restrictive than those contained elsewhere in this instruction, nor intended to be a single source document for procedures contained in other directives or publications. Avoid unnecessary repetition of guidance provided in other established directives; however, reference to those directives is acceptable when it serves to facilitate location of information necessary for local operating procedures. This chapter is authorized to be issued to each A/OA-10 pilot. MAJCOMs or other subordinate agencies (NAF, Center, etc.), may direct publication approval channels and a specific format for Chapter 8 based on unique flying areas, missions, and/or procedures.

8.2. Procedures. Unless changed by MAJCOM or subordinate agency, the following procedures apply:

8.2.1. When published, units will forward copies to MAJCOM and appropriate subordinate agencies, who will review the Chapter 8 and return comments/required changes back to the unit(s), if appropriate. The process need not delay distribution unless specified otherwise by MAJCOM or a subordinate agency. If a procedure applies to all A/OA-10 units, it will be incorporated into the basic publication.

8.2.2. Organize the local chapter in the following format to include, but not limited to, the following:

- 8.2.2.1. Section A--Introduction
- 8.2.2.2. Section B--General Policy
- 8.2.2.3. Section C--Ground Operations
- 8.2.2.4. Section D--Flying Operations
- 8.2.2.5. Section E--Weapons Employment
- 8.2.2.6. Section F--Abnormal Procedures
- 8.2.2.7. Attachments (Illustrations)

8.2.3. This chapter will include procedures for the following, if applicable:

- 8.2.3.1. Command and Control
- 8.2.3.2. Fuel Requirements and Bingo Fuels
- 8.2.3.3. Diversion Instructions
- 8.2.3.4. Jettison Areas (IFR/VFR)
- 8.2.3.5. Jettison Procedures/Parameters
- 8.2.3.6. Controlled Bailout Areas
- 8.2.3.7. Local Weather Procedures
- 8.2.3.8. Securing Aircraft After Emergencies
- 8.2.3.9. Approved Alternate Missions
- 8.2.3.10. Cross-Country/Service Procedures

8.2.3.11. Search and Rescue (SARCAP) Procedures

8.2.4. (PACAF) This chapter will also include local guidance detailing maximum allowable wind and sea states for flying operations.

Chapter 9**MAJOR COMMAND OPERATING PROCEDURES**

9.1. General. This chapter may be submitted through HQ ACC/DOTV for HQ USAF/XO approval by the MAJCOMs to delete, change, or insert procedures as applicable

MARVIN R. ESMOND, Lt General, USAF
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Attachment 1

GLOSSARY OF SUPPORTING INFORMATION

Abbreviations and Acronyms

ACBT—Air Combat Training

(D)ACBT—(Dissimilar) Air Combat Training

AFAC—Air Forward Air Controller

AGL—Above Ground Level

AOA—Angle of Attack

APU—Auxiliary Power Unit

ATC—Air Traffic Control

AWACS—Airborne Warning and Control System

BFM—Basic Fighter Maneuver

BIT—Built in test

BMC—Basic Mission Capable

CMR—Combat Mission Ready

DACT—Dissimilar Air Combat Tactics

ECM—Electronic Countermeasures

EMCON—Emission Control

EOR—End of Runway

FAF—Final Approach Fix

FCF—Functional Check Flight

FCIF—Flight Crew Information File

FLIP—Flight Publications

FTU—Formal Training Unit

FWS—Fighter Weapons School

GCAS—Ground Collision Avoidance System

GCI—Ground Control Intercept

GFAC—Ground Forward Air Controller

HHQ—Higher Headquarter

HUD—Head Up Display

IFF—Identification, Friend or Foe

IFR—Instrument Flight Rules

IMC—Instrument Meteorological Conditions

INS—Inertia Navigation System

IQT—Initial Qualification Training

JOAP—Joint Oil Analysis Program

LASTE—Low Altitude Safety and Targeting Enhancement

MCOPR—MAJCOM Office of

MOA—Military Operating Area

MSA—Minimum Safe Altitude

MSL—Mean Sea Level

MVR—Maneuver

NGB—National Guard Bureau

NORDO—No Radio

NVG—Night Vision Goggles

NVIS—Night Vision Imaging System

PDM—Programmed Delivery for Maintenance

RCO—Range Control Officer

RCR—Runway Conditions Reading

ROE—Rule of Engagement

RWR—Radar Warning Receiver

SA—Surface Attack or Situational Awareness

SAT—Surface Attack Tactics

SIF—Selective Identification

TACAN—Tactical Air Navigation

TOLD—Take off Landing Data

TOT—Time over Target

VFR—Visual Flight Rules

VLD—Visual Level Delivery

VMC—Visual Meteorological Conditions

VTR—Video Tape Recorder

Attachment 2

GENERAL BRIEFING GUIDE

A2.1. Mission Preparation:

- A2.1.1. Time Hack
- A2.1.2. EP/Threat of the Day
- A2.1.3. Mission Objective(s)
- A2.1.4. Mission Overview
- A2.1.5. Mission Data Card
 - A2.1.5.1. Mission Commander/Deputy Lead
 - A2.1.5.2. Joker/Bingo Fuel
 - A2.1.5.3. Takeoff and Landing Data
 - A2.1.5.4. Working Area
- A2.1.6. Environmental Conditions
 - A2.1.6.1. Weather/TDA
 - A2.1.6.2. Sunrise/Sunset (If Applicable)
 - A2.1.6.3. Moon Illumination (If Applicable)
- A2.1.7. NOTAMs
- A2.1.8. Personal Equipment
- A2.1.9. FCIF/Pubs/Maps

A2.2. Ground Procedures:

- A2.2.1. Pre-Flight
 - A2.2.1.1. Aircraft
 - A2.2.1.2. Armament
- A2.2.2. Ground Crew Briefing (When Applicable)
 - A2.2.2.1. Act only on Pilot's instructions
 - A2.2.2.2. Ground emergency procedures
 - A2.2.2.3. Hand signals
 - A2.2.2.4. Aircraft Danger Areas
- A2.2.3. Check-in
- A2.2.4. Taxi/Marshalling/Arming
- A2.2.5. Spare Procedures

A2.3. Takeoff:

- A2.3.1. Runway Lineup
- A2.3.2. Formation Takeoff
- A2.3.3. Takeoff Interval
- A2.3.4. Abort
- A2.3.5. Landing Immediately After Takeoff

A2.4. Departure:

- A2.4.1. Join-up
- A2.4.2. Formation
- A2.4.3. Ops Checks

A2.5. Recovery:

- A2.5.1. Rejoin
- A2.5.2. Battle Damage/Bomb Check (If Applicable)
- A2.5.3. Flight Breakup (If Applicable)
- A2.5.4. Contingency Routing
 - A2.5.4.1. Hung/Unexpended Ordnance (If Applicable)
 - A2.5.4.2. Weapons/Aircraft Malfunction (If Applicable)
- A2.5.5. Pattern and Landing
- A2.5.6. Landing/De-Arm

Attachment 3

SPECIAL SUBJECTS BRIEFING GUIDE

A3.1. Instructor Responsibilities

A3.2. Chase Procedures

A3.3. IFF Procedures

A3.4. Visual Search Responsibilities/Midair Collision Avoidance/Flight Path Deconfliction

A3.5. Dissimilar Formations

A3.6. Terrain Avoidance:

A3.6.1. Departure/En Route/Recovery

A3.6.2. Use of Radar Altimeters

A3.7. Bird Strike Procedures/Use of Visor(s)

A3.8. Hazards Associated With Human Factors (i.e., Channelized Attention, Task Saturation/Prioritization, and Complacency)

A3.9. G-Awareness:

A3.9.1. Turn/G-Suit Connection/G-tolerance

A3.9.2. Use of L-1 Anti-G Straining Maneuver (AGSM)

A3.10. Visual Illusions/Perceptions

A3.11. Spatial Disorientation/Unusual Attitudes/G Excess Illusion

A3.12. Lost Wingman

A3.13. Radio Inoperative

A3.14. SARCAP

A3.15. Recall Procedures

A3.16. SIIs

Attachment 4**INSTRUMENT/NAVIGATION BRIEFING GUIDE****A4.1. Climb:**

A4.1.1. Instrument Departure

A4.1.1.1. Power Setting/Airspeed

A4.1.1.2. Trail Departure (If Applicable)

A4.1.1.3. Routing (SID, Radar Vectors, etc.)

A4.1.2. Level Off

A4.1.3. Formation

A4.2. Cruise:

A4.2.1. En route

A4.2.2. Cruise Data

A4.2.3. Nav Aids

A4.2.4. Fuel Awareness/Ops Checks

A4.3. Area:

A4.3.1. Airwork

A4.3.1.1. Airspace Restrictions

A4.3.1.2. Area Orientation

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- A5.2.1. Departure
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- A7.2.2. Number/Type Aircraft
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A7.3. Escort Procedures:

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A8.1.3. Entry/Spacing/Holding

A8.2. Route Procedures:

A8.2.1. Airspace Restrictions

A8.2.2. Fence Checks

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A8.2.4. G-Awareness/Warm-up

A8.2.5. Low Level Navigation

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A8.2.5.2. Use of Nav Aids/INS

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A8.2.6.3. LOWAT (If Applicable)

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A8.3.2. Two/Three Ship Options

A8.3.3. Low Level Safety Procedures

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A8.3.3.2. Time to Ground Impact

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A8.3.6. Special Operating Instructions (If Applicable)

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- A9.2.2. Restrictions
- A9.2.3. Range Entry/Holding
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- A9.3.1. Switch Positions
 - A9.3.1.1. Arming
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 - A9.3.2.1. Entry Airspeed/Altitude
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 - A9.3.2.4. Pull Down/Apex Altitudes
 - A9.3.2.5. Pattern Corrections
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A9.3.4.5. Sight Picture/Corrections/Aim-Point

A9.3.4.6. Release Parameters

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A9.3.4.8. Recovery Procedures

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A9.4.1. Aircraft Lighting

A9.4.2. Radio Calls

A9.4.3. Target ID/Range Lighting

A9.4.4. Night Spacing Techniques

A9.4.5. Instrument Cross-check/Disorientation

A9.4.6. Flare Pattern

A9.4.6.1. Flare Release Points and Interval

A9.4.6.2. Wind Effect/Offset

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A9.5. Over Water Range Operations:

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A9.5.1.3.1. Timing

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A9.5.2. Special Considerations

A9.5.2.1. Adjusted Minimum Altitudes

A9.5.2.2. Training Rules/Special Operating Procedures

A9.6. Range Departure/Recovery:

A9.6.1. Armament Safety Checks

A9.6.2. Rejoin

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A9.6.4. Hung Ordnance

A9.6.5. Inadvertent Release

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A9.7. Special Subjects:

A9.7.1. Error Analysis

A9.7.2. Air to Surface Training Rules/Special Operating Instructions

A9.7.3. Fouls

A9.7.4. Minimum Altitudes

A9.7.5. Maneuvering Limitations

A9.7.5.1. Aircraft

A9.7.5.2. Stores (Carriage/Release)

A9.7.6. Target Fixation/Channelized Attention

A9.7.7. Time to Ground Impact

A9.7.7.1. Wings Level

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A9.7.9. Alternate Mission

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- A10.1.1. Intelligence/Threat Scenario
- A10.1.2. Low Level (See Low Level Briefing Guide)
- A10.1.3. Fence Checks
- A10.1.4. G-Awareness/Warm-up
- A10.1.5. Operating Area Entry/Description/ Boundaries
- A10.1.6. Target Area/Clearing Pass
 - A10.1.6.1. Location/Description/Elevation/TOT
 - A10.1.6.2. Visual Cues in the Target Area
 - A10.1.6.3. Target Area Weather
 - A10.1.6.3.1. Ceiling/Visibility
 - A10.1.6.3.2. Winds/Altimeter
 - A10.1.6.3.3. Sun Angle/Shadows
- A10.1.7. Threat Array
 - A10.1.7.1. Type/Capabilities
 - A10.1.7.2. Locations
 - A10.1.7.3. Countermeasures
 - A10.1.7.3.1. Chaff/Flare
 - A10.1.7.3.2. Terrain Masking
 - A10.1.7.3.3. Radio Silent Procedures
 - A10.1.7.3.4. Authentication/Comm-Jamming/Chattermark Procedures
 - A10.1.7.4. Threat Reactions
 - A10.1.7.4.1. LOWAT (If Applicable)

A10.2. Delivery:

- A10.2.1. Tactics
 - A10.2.1.1. Overview
 - A10.2.1.2. Ingress
 - A10.2.1.2.1. Formation

A10.2.1.2.2. Speed/Altitude

A10.2.1.3. Weapons Delivery

A10.2.1.3.1. Type Delivery

A10.2.1.3.2. Switchology

A10.2.1.3.3. Attack Parameters

A10.2.1.3.3.1. Action Point/Pop Point

A10.2.1.3.3.2. Altitudes (Pull-Down/Apex/Release/Minimum)

A10.2.1.3.4. Visual Lookout/Mutual Support Responsibilities

A10.2.1.4. Egress

A10.2.1.4.1. Recovery/Return to Low Altitude

A10.2.1.4.2. Loss of Mutual Support/Rendezvous Point

A10.3. Night Procedures (If Applicable):

A10.3.1. Aircraft Lighting

A10.3.2. Radio Calls

A10.3.3. Target ID/Range Lighting

A10.3.4. Night Spacing Techniques/Minimum Altitudes

A10.3.5. Instrument Cross-check/Disorientation

A10.3.6. Flare Pattern

A10.3.6.1. Flare Release Points and Interval

A10.3.6.2. Wind Effect/Offset

A10.3.6.3. Dud Flare Procedures

A10.3.6.4. Switching Aircraft Patterns

A10.3.7. Rejoin/Range Departure

A10.3.8. Battle Damage/Bomb Check

A10.3.9. Mission Reporting (BDA/In-flight Report)

A10.4. Contingencies:

A10.4.1. Two/Three Ship Options

A10.4.2. Tactical Lead Changes

A10.4.3. Air-to-Air TACAN

A10.4.4. Codewords

A10.4.5. Weather Backup Deliveries

A10.4.6. Degraded Systems

A10.4.7. Reattack

A10.4.8. Asymmetric Considerations

A10.4.9. Jettison Procedures/Parameters

A10.4.10. Hung/Unexpended Ordnance Procedures

A10.4.11. Wounded Bird/Escort Procedures

A10.5. Special Subjects:

A10.5.1. Air-to-Surface Training Rules/Special Operating Instructions

A10.5.2. LOWAT Training Rules (If Applicable)

A10.5.3. Maritime Training Rules (If Applicable)

A10.5.4. Night Procedures (If Applicable)

A10.5.5. Hazards Associated With Human Factors (i.e., Channelized Attention, Task Saturation/ Prioritization, and Complacency)

A10.5.6. Alternate Mission

Attachment 11**AIR-TO-SURFACE WEAPONS EMPLOYMENT CLOSE AIR SUPPORT/INTERDICTION/
ARMED RECCE FAC/JAAT BRIEFING GUIDE****A11.1. General Information:**

- A11.1.1. Intelligence/Threat Scenario
- A11.1.2. Low Level (See Low Level Briefing Guide)
- A11.1.3. Ordnance/Weapons Data
 - A11.1.3.1. Type/Fuzing
 - A11.1.3.2. Weapon Settings
 - A11.1.3.3. Live Ordnance Procedures/Minimum Altitudes
 - A11.1.3.3.1. Safe Escape/Safe Separation
 - A11.1.3.3.2. Fuse Arming/Frag Avoidance
 - A11.1.3.4. Laser Operations
- A11.1.4. En route Formation(s)/Look Out Responsibilities/LOWAT (If Applicable)
- A11.1.5. Fence Checks
- A11.1.6. G-Awareness/Warm-up
- A11.1.7. Control Agency
 - A11.1.7.1. Call Sign
 - A11.1.7.2. Frequencies

A11.2. Armed Recce Procedures:

- A11.2.1. Recce Route/Altitudes
- A11.2.2. Formations
- A11.2.3. Target Types
- A11.2.4. Engagement Criteria
- A11.2.5. Attack Tactics--Refer to Weapons Delivery

A11.3. JAAT Procedures:

- A11.3.1. Controlling Agencies
 - A11.3.1.1. Air Battle Captain (ABC)
 - A11.3.1.2. HeloFAC
- A11.3.2. Coordination
 - A11.3.2.1. AVN CDR/HeloFAC-to-Fighter Brief

A11.3.2.2. Unmask Call/Code Words

A11.3.2.3. Airspace Restrictions

A11.3.2.3.1. Helicopter Altitude Block

A11.3.2.3.2. Fighter Altitude Block

A11.3.2.3.3. Artillery Corridor/Separation

A11.4. FAC Procedures:

A11.4.1. Call Sign/Mission Number

A11.4.2. Primary/Alternate Target Area

A11.4.2.1. Description

A11.4.2.2. Frequencies

A11.4.3. Rendezvous Point/TOT/Authentication Procedures

A11.4.4. Fighter--FAC Briefing

A11.4.4.1. Mission Number

A11.4.4.2. Ordnance (Simulated/Actual)

A11.4.4.3. Playtime

A11.4.5. FAC--Fighter Briefing

A11.4.5.1. Friendly Position

A11.4.5.2. Restrictions

A11.4.6. Target Description

A11.4.6.1. Location/Elevation

A11.4.6.2. Highest Obstacle Within 5 NM

A11.4.6.3. Description

A11.4.6.4. Positions of Enemy/Friendly Troops

A11.4.7. Attack Tactics

A11.4.7.1. Type Attack/Attack Restrictions

A11.4.7.2. Direction of Attack Recovery

A11.4.7.3. Ordnance Delivery Procedures (Refer to Weapons Delivery)

A11.5. Weapons Delivery:

A11.5.1. Tactics

A11.5.1.1. Type Delivery

A11.5.1.2. Switchology

A11.5.1.3. Attack Parameters

A11.5.1.3.1. Action Point/Pop Point

A11.5.1.3.2. Altitudes (Pull-Down/Apex/Release/Minimum)

A11.5.1.4. Visual Lookout/Mutual Support Responsibilities

A11.5.1.5. Egress

A11.5.1.5.1. Recovery/Return to Low Altitude

A11.5.1.5.2. Loss of Mutual Support/Rendezvous Point

A11.5.2. Battle Damage/Bomb Check

A11.5.3. Mission Reporting (BDA/In-flight Report)

A11.6. Contingencies:

A11.6.1. Two/Three Ship Options

A11.6.2. Tactical Lead Changes

A11.6.3. Air-to-Air TACAN

A11.6.4. Codewords

A11.6.5. Weather Backup Deliveries

A11.6.6. Degraded Systems

A11.6.7. Reattack

A11.6.8. Asymmetric Considerations

A11.6.9. Jettison Procedures/Parameters

A11.6.10. Hung/Unexpended Ordnance Procedures

A11.6.11. Wounded Bird/Escort Procedures

A11.7. Special Subjects:

A11.7.1. Air-to-Surface Training Rules

A11.7.2. LOWAT Training Rules (If Applicable)

A11.7.3. Night Procedures (If Applicable)

A11.7.4. Hazards Associated With Human Factors (i.e., Channelized Attention, Task Saturation/Prioritization, and Complacency)

A11.7.5. Alternate Mission

Attachment 12**AIR-TO-SURFACE WEAPONS EMPLOYMENT COMBAT SAR BRIEFING GUIDE****A12.1. Combat SAR Procedures:**

A12.1.1. Enroute to SAR Area

A12.1.1.1. Formation

A12.1.1.2. Route

A12.1.1.3. Cruise Data

A12.1.1.4. Control Agency(s) Call Sign/Frequencies

A12.1.1.5. Holding Points And Procedures

A12.1.1.6. Safe Areas

A12.1.2. Electronic/Visual Search

A12.1.2.1. Minimum Altitudes/Airspeeds

A12.1.2.2. Patterns and Wingman Position/Responsibilities

A12.1.2.3. Radio Procedures

A12.1.2.4. Look-Out Doctrine

A12.1.2.5. Low Altitude Hazards

A12.1.2.6. IP Selection and Ingress Route

A12.1.2.7. Survivor Briefing/Authentication

A12.1.3. Helicopter Rendezvous/Escort

A12.1.3.1. Helicopter Call Sign

A12.1.3.2. Altitude/Airspeed

A12.1.3.3. Helicopter Briefing

A12.1.3.4. Type Formation/Patterns for Escort

A12.1.3.5. Tactics

A12.1.3.6. ECM/RWR

A12.1.3.7. Suppression

A12.1.3.8. Pick-Up Techniques

A12.1.3.9. Hover Cover Patterns

A12.1.3.10. Egress Route/Altitude

A12.1.4. FAC/SCAR Procedures

A12.1.5. Ordnance Considerations (Refer to Weapons Delivery)

A12.1.6. Ops Checks

A12.1.7. Fuel Considerations (Tanker Availability)

A12.1.8. After Pick-up Procedures

A12.1.8.1. Target Area Egress, Rejoin, Ordnance Checks and Return Navigation

A12.1.8.2. Recovery With Weapons Malfunctions.

Attachment 13

AIR-TO-SURFACE WEAPONS EMPLOYMENT AIR STRIKE CONTROL BRIEFING GUIDE

A13.1. Intelligence:

A13.1.1. Controlling Agencies

A13.1.2. Enemy Positions/Defenses

A13.1.3. Friendly Positions

A13.1.3.1. Call Sign/Ground Commander/Ground FAC

A13.1.3.2. Frequencies

A13.1.3.3. Minimum Altitudes

A13.1.4. Threat Information

A13.1.5. E&E/SAFE Areas

A13.1.6. SAR

A13.1.7. Authentication/Code Words

A13.2. Local Operating Procedures

A13.3. Range/MOA Data:

A13.3.1. Frequencies

A13.3.2. Boundaries

A13.3.3. Entry/Exit

A13.3.4. Restrictions

A13.3.5. G-Awareness/Warm-up

A13.4. FAC Strike Data:

A13.4.1. Fighters/ATO Information

A13.4.1.1. Call Sign/Mission Number/Frequencies

A13.4.1.2. Type Ordnance

A13.4.1.3. Contact Point/TOT

A13.4.1.4. Restrictions

A13.4.2. Sequence of Delivery/Fuzing

A13.4.3. FAC Tactics

A13.4.3.1. Alternate Plan for Weather

A13.4.3.2. Late/No Fighters

A13.4.3.3. Worsening Ground Situation

A13.4.4. Target Description

A13.4.4.1. Location / Elevation

A13.4.4.2. Highest Obstacle Within 5 NM

A13.4.4.3. Description

A13.4.4.4. Positions of Enemy / Friendly Troops

A13.4.5. Target Marking

A13.4.5.1. Switch Procedures

A13.4.5.2. Delivery Data

A13.4.5.3. Minimum Delivery Altitudes

A13.4.5.4. Footprint Data

A13.4.5.5. Ground Marking Techniques

A13.4.6. Clearance Procedures

A13.4.6.1. Cold/Hot/Dry

A13.4.6.2. Ground Commander/FFAC

A13.4.7. Mandatory Calls

A13.4.7.1. Clearance

A13.4.7.2. Armament Safety Check/Fuel

A13.4.8. Minimum Airspeeds

A13.4.9. Battle Damage Check

A13.4.10. BDA

A13.4.11. FAC to ASOC Brief/Debrief

A13.5. Contingencies:

A13.5.1. Range/MOA Emergency Procedures/ NORDO

A13.5.2. Hung/Unexpended Ordnance Procedures

A13.6. FAC-to-Fighter Pre-mission Brief

A13.7. Air-to-Surface Training Rules

Attachment 14**NIGHT VISION GOGGLE (NVG) CONSIDERATIONS**

A14.1. General Note. This guide is meant to highlight general NVG considerations, and provides a reference for a basic NVG briefing. All applicable NVG considerations should be incorporated into the specific briefing for the mission being flown.

A14.2. Weather/Illumination:

- A14.2.1. Civil/nautical twilight
- A14.2.2. Moon rise/set times/phase/elevation/azimuth
- A14.2.3. Ceiling/visibility
- A14.2.4. LUX/EO TDA
- A14.2.5. Obscurants to visibility

A14.3. NVG Preflight:

- A14.3.1. Check adjustments/helmet fit and security
- A14.3.2. Batteries
- A14.3.3. Resolution/focus (eye lane)
- A14.3.4. NVG compatible flashlight

A14.4. Cockpit Preflight:

- A14.4.1. Cockpit setup
- A14.4.2. Cockpit lighting (leaks)/mirrors up
- A14.4.3. Cockpit FAM
- A14.4.4. Check focus ,stow for taxi

A14.5. Before Takeoff:

- A14.5.1. Don NVGs/check and adjust/disconnect
- A14.5.2. Stow for takeoff

A14.6. Airborne:

- A14.6.1. Exterior lights
- A14.6.2. Scan pattern
 - A14.6.2.1. Forward scan
 - A14.6.2.2. Narrow field of view
 - A14.6.2.3. Peripheral vision

A14.6.2.4. Scan techniques

A14.6.3. Join-up and enroute altitude/airspeed

A14.6.3.1. Rejoin/closure

A14.6.3.2. Air-Air TACAN

A14.7. Mission:

A14.7.1. Route study/scene interpretation

A14.7.1.1. NVG predictions/ALBIDO

A14.7.1.2. Terrain/shadowing/visual illusions

A14.7.1.3. City/cultural lighting

A14.7.1.3.1. Direction/orientation of lighting

A14.7.2. Aggressive formation maneuvering

A14.7.3. Radar altimeter usage

A14.7.4. Map reading

A14.8. Target Area:

A14.8.1. RV/Holding procedures (NVG differences)

A14.8.2. Target study/acquisition (NVG predictions)

A14.8.3. Deliveries/Pattern procedures

A14.8.3.1. Minimum altitudes

A14.8.3.2. Flight member responsibilities

A14.8.3.3. Moth effect/Deconfliction

A14.8.4. Laser/IR Pointer Operations

A14.8.5. Threat I.D and reaction

A14.8.6. Egress

A14.9. NVG Safety:

A14.9.1. Lost sight--NVGs

A14.9.2. Lost wingman--NVGs

A14.9.3. Depth perception

A14.9.4. Visual illusions

A14.9.5. NVG failure

A14.9.6. Battery failure

A14.9.7. Overconfidence in NVG Capabilities

A14.9.8. Transition to Instruments

A14.9.9. Correct lighting of primary/secondary flight instruments

A14.9.10. Disorientation/misorientation/vertigo

A14.9.11. Target fixation

A14.9.12. Lack of dive information

A14.9.13. Fatigue

A14.9.14. Aircraft emergency

A14.9.15. Ejection--GOGGLES--OFF

Attachment 15**MISSION DEBRIEFING GUIDE****A15.1. Ground Procedures****A15.2. Takeoff, Join-up, Departure****A15.3. En route Procedures****A15.4. Mission Accomplishment/Analysis:**

A15.4.1. Mission Reconstruction

A15.4.2. Mission Support (FAC, GCI, Helicopters, etc.)

A15.4.3. VTR/Film Assessment (If Applicable)

A15.4.4. Learning Objectives Achieved

A15.4.5. Lessons Learned

A15.4.6. Anti-G Straining Maneuver Effectiveness

A15.4.7. Recommendations for Improvement

A15.5. Recovery/Landing/After Landing**A15.6. General**

A15.6.1. Radio Procedures

A15.6.2. Flight Discipline/Effectiveness

A15.6.3. General Areas for Improvement

A15.7. Comments/Questions

Attachment 16**NVG COCKPIT SET-UP**

A16.1. Filter Covers. Units will only use MAJCOM-approved NVG compatible (Glendale Green type) filter covers for non-NVIS versions of the following components: ADI, HSI, altimeter, airspeed indicator, VVI, or standby ADI. If a MAJCOM-approved solution is not available, then pilots will turn off the affected rheostat and follow the chem stick procedures below.

NOTE:

(USAFE) The USAFE-approved solution is contained in [Attachment 17](#).

A16.2. Non-NVIS Components. For any components other than those listed in paragraph [3.20.10.1](#) that are non-NVIS, units/pilots may turn the component's lights off, or cover with Glendale Green, or cover with electrical tape, or have unit maintenance turn them off at the lighting balance box, as appropriate. (It is preferable to turn off the RFI and fuel gauge lighting at the balance box to allow the internal green illumination of the standby ADI to be used. If the RFI cannot be completely turned off, it should be taped over due to its position next to the standby ADI. If this is not practical, then the auxiliary instrument rheostat should be turned off.) Follow the applicable chem stick procedures below for each rheostat that is turned off due to incompatible light sources.

A16.3. Standardized Chem Stick Locations. The following nine standardized chem stick locations have been developed and will be referred to by position number:

A16.3.1. 6" chem stick under right side of the glare shield.

A16.3.2. 6" chem stick under left side of the glare shield.

A16.3.3. 6" chem stick under center of the glare shield.

A16.3.4. 4" chem stick mounted vertically on the right side of the HSI.

A16.3.5. 4" chem stick mounted vertically on the left side of the HSI.

A16.3.6. 1.5" chem stick mounted vertically on the 9 o'clock position of the airspeed indicator. (pilot option)

A16.3.7. 1.5" chem stick mounted vertically on the 9 o'clock position of the standby ADI. (pilot option)

A16.3.8. 6" chem stick under the right canopy rail.

A16.3.9. 6" chem stick under the left canopy rail.

A16.4. Special Notes:

A16.4.1. Chem sticks placed under the glare shield will be mounted at the front edge of the glare shield to minimize shadowing on the instruments below, will be placed in plastic holders adjusted to the fully open position, and will be angled to point the illumination toward the instrument panel.

A16.4.2. 4" chem sticks placed vertically on each side of the HSI will be placed in plastic holders and will be angled to point the illumination toward the HSI, the left engine instruments, or both as

required. 4" chem stick plastic holders are made by cutting 6" plastic holders, taping at both ends, and will be adjusted to the half open position. Instead of cutting 6" plastic holders, units may use black irrigation tubing cut to fit the length of the chem stick with a 3/16th inch by 2.25 inch window cut into the tube for illumination.

A16.4.3. When using positions 6 or 7, pilots must use caution to ensure they do not obstruct a portion of the instrument's markings.

A16.4.4. Pilots should finely adjust the position of the chem sticks to maximize illumination and minimize glare.

A16.5. Chem Stick Configurations. For every rheostat (flight instrument, auxiliary instrument, engine instrument, or console) that is turned off, the following chem stick configurations will be used:

A16.5.1. Flight instrument rheostat: positions 1, 2, 3, 4, and 5. Position 6 may be used at pilot discretion.

A16.5.2. Auxiliary instrument rheostat: positions 1, 2, and 3. Position 7 may be used at pilot discretion.

A16.5.3. Engine instrument rheostat: position 1 and 4 where the 4" chem stick plastic holder at position 4 is angled to point the illumination toward the left engine instruments. If both the flight instrument and engine instrument rheostats are turned off, then the 4" chem stick plastic holder at position 4 will be angled to point the illumination toward the HSI, and will be modified with an additional 3/16th inch by 2.25 inch window on the right side to allow illumination toward the left engine instruments.

A16.5.4. Console rheostat: pilots will use the floodlights in the dim or greater position.

A16.5.5. Console rheostat with inoperative floodlights: pilots will place chem sticks in positions 8 and 9.

A16.6. Unmodified Aircraft. For aircraft that have not been modified, pilots will place chem sticks in all nine positions IAW paragraphs [A16.3.1.](#) through [A16.3.9.](#) The rest of the cockpit setup will continue to be IAW the unmodified cockpit checklist in appendix B of the Jun. 94 A/OA-10 NVG transition manual. Training will be limited to cadre IPs on CAT I sorties.

A16.7. Additional Chem Sticks. Units and/or pilots may add additional chem sticks to the configurations above. However, they must ensure they do not place chem sticks in positions that block critical information.

Attachment 17

NVG COCKPIT SET-UP CHECKLIST AND DEGRADED COCKPIT TRAINING LIMITATIONS

A17.1. General. Use the following procedures if cockpit lighting is not NVIS compatible. This checklist may be arranged to suit unit needs; however, it contains the minimum items and information required on locally produced checklists.

A17.1.1. Instruments/Master Caution: (See paragraphs [A17.1.4.](#) and [A17.1.5.](#))

A17.1.1.1. **AOA Indicator Lights**--Blacken with electrical tape

A17.1.1.2. **Fuel Quantity Indicator**--Glendale Green (3.5" x 3.5")

A17.1.1.3. **Flap Position Indicator**--Glendale Green (2.25" x 2.25")

A17.1.1.4. **Master Caution Light**--Glendale Green (1.5" x 0.5") - DOUBLE

A17.1.2. Radio/IFF/NAV Equipment: (See paragraph [A17.1.4.](#))

A17.1.2.1. **IFF Test and Reply Lights**--Blacken with electrical tape

A17.1.2.2. **Marker Beacon Light**--Blacken with electrical tape

A17.1.2.3. **Nav Mode Select Panel Buttons**--Glendale Green (11/16" x 11/16")

A17.1.2.4. **Radio Call Number**--Blacken with electrical tape

A17.1.2.5. **TACAN Test Light**--Blacken with electrical tape

A17.1.2.6. **UHF and FM Homing Lights**--Blacken with electrical tape

A17.1.2.7. **UHF Remote Frequency Indicator**--Glendale Green (1" x 3")

A17.1.2.8. **VHF-AM/FM Control Head**--Off at balance box OR Console Rheostat OFF

A17.1.3. Weapons/ECM: (See paragraph [A17.1.4.](#))

A17.1.3.1. **AIM-9 Ready Light**--Blacken with electrical tape

A17.1.3.2. **BIT light on TVM Panel**--Blacken with electrical tape

A17.1.3.3. **Chaff/Flare Ready Lights**--Blacken with electrical tape

A17.1.3.4. **ECM Buttons**--Glendale Green (0.75" x 0.75")

A17.1.3.5. **ECM Control Head**--Off at balance box OR Console Rheostat OFF

A17.1.3.6. **Gun Ready Light**--Glendale Green (1.5" x 0.5")

A17.1.3.7. **HUD Malfunction Light**--Blacken with electrical tape

A17.1.3.8. **Pave Penny Panel Buttons**--Glendale Green (11/16" x 11/16") - DOUBLE

A17.1.3.9. **RWR Buttons**--Glendale Green (11/16" x 11/16")

A17.1.3.10. **VTR Tape Display Lights and Counter**--Blacken with electrical tape

A17.1.3.11. **Weapons Station Select Buttons**--Glendale Green (11/16" x 11/16")

A17.1.4. If blackened with tape or covered with Glendale Green or not NVIS modified, turn off or dim the following to the lowest practical setting as appropriate:

A17.1.4.1. Armament Control Panel (ACP), Pave Penny panel, HUD control panel, TVM control panel (ACP Rheostat--OFF)

A17.1.4.2. Accelerometer/compass lights (OFF)

A17.1.4.3. AOA/Refueling Indexer lights

A17.1.4.4. ECM buttons

A17.1.4.5. IFF Test and Reply lights

A17.1.4.6. Modified Map lights (OFF)

A17.1.4.7. Weapons Station Select lights

A17.1.4.8. RWR buttons

A17.1.4.9. Signal lights--DIM

A17.1.5. If any Caution Light Panel lights are not NVIS modified, cover panel with a 5" x 12" black velvet strip folded in half and held in place by hook velcro.

A17.1.6. Pre-Takeoff Lighting Compatibility Checks:

A17.1.6.1. NVGs--Focus to infinity.

A17.1.6.2. With the NVGS on, check the cockpit for any non-compatible light.

A17.1.6.3. Rheostat(s)--OFF, for any lighting that can not be covered, taped, or dimmed IAW procedures above.

A17.1.6.4. If Rheostat(s)--OFF, follow chem stick placement procedures and training limitations below.

A17.1.6.5. Ensure lighting intensity balance and readability of all primary flight instruments.

Table A17.1. Chem Stick Placement Procedures.

If Rheostat Turned OFF	Then Chem Sticks Required in Position #
Primary Flight Instruments	1, 2, 3, 4, 5, and 6
Aux Instruments	1, 2, 3, 4, and 7
Engine Instruments	1 and 4 (double opening holder)
Console (use floodlights in DIM or greater)	8 and 9 (if floodlights inop or unmodified)
ACP	1, 2, and 3 (use finger/flood lights as needed)
Positions: 1. 6" Under right side of glare shield (see note). 2. 6" Under left side of glare shield (see note). 3. 6" Under Fire Pull T- handles (see note). 4. 4" Vertically on right side of HSI pointed at HIS. 5. 4" Vertically on left side of HSI pointed at HIS. 6. 1.5" Vertically on left side of Airspeed Indicator (see note). 7. 1.5" Vertically on left side of STBY ADI (see note). 8. 6" Under right canopy rail. 9. 6" Under left canopy rail.	
Note. Positions 1, 2, and 3 will be fully open, mounted at the front edge of the glare shield, and adjusted to maximize illumination and minimize shadowing. Do not block instrument markings when using positions 6 and 7.	

A17.1.7. Degraded Cockpit Training Limitations:

A17.1.7.1. NVG Qualified Pilots. Any type sortie if the following instruments are NVIS modified or equipped with NVIS instrument filter covers (if applicable).

A17.1.7.1.1. ADI

A17.1.7.1.2. Altimeter

A17.1.7.1.3. Airspeed Indicator

A17.1.7.1.4. HSI

A17.1.7.1.5. Fuel Gage

A17.1.7.1.6. RFI

A17.1.7.1.7. VVI

NOTE:

Instruments cited in subparagraphs [A17.1.7.1.1.](#) through [A17.1.7.1.7.](#) are approved for use with NVIS filter cover

A17.1.7.2. NVG Ips. Any air to ground sortie if any of the above instruments are not NVIS compatible or do not have approved NVIS filter covers installed (as required).

A17.1.7.3. **All Other Pilots.** NVG familiarization sorties/events and basic weapons delivery sorties/events IAW AFI 11-2A/OA10V1 if any of the above instruments are not NVIS compatible or do not have approved NVIS filter covers installed (as required).

A17.1.7.4. **NVG Ips.** NVG familiarization sorties/events and basic weapons delivery sorties/events IAW AFI 11 2A/OA10V1 if in unmodified aircraft.

Attachment 18

(USAFE) USAF NIGHT VISION GOGGLES (NVG) COCKPIT MODIFICATION PROCEDURES

A18.1. NVG MQT Training. For NVG Mission Qualification Training (MQT) pilots, the following equipment *MUST BE MODIFIED*.

A18.1.1. All equipment on the forward console *excluding*:

A18.1.1.1. Flight instruments (must have filters installed if unmodified [MQT only]).

A18.1.1.2. Remote frequency indicator (RFI).

A18.1.1.3. Fuel indicator.

A18.1.1.4. RWR.

A18.1.1.5. T-handles.

A18.1.2. The master caution panel must be modified.

A18.1.3. Follow modification procedures outlined in paragraph [A11.7](#).

A18.2. NVG IPs Flying Partially Modified Aircraft. NVG IPs with flying CC or DO approval, may fly aircraft with varying degrees of modification and will be handled on an individual basis. Factors such as mission, weather, and IP experience will be taken into account. IPs (other than initial cadre) will not fly fully unmodified aircraft.

A18.3. Initial Cadre. Initial cadre NVG IPs may fly fully *unmodified aircraft* on non-tactical sorties only.

A18.4. Modification Procedures. For proper procedures on modifying the unmodified components of various cockpits see paragraph [A16.5](#).

A18.5. Mixed NVG Formations. Flights with mixed NVG and non-NVG pilots will use the following guidance:

A18.5.1. NVG-qualified pilots are authorized to fly with goggles while leading or flying as wingman, with the other flight member not using NVGs.

A18.5.2. All NVG and non-NVG considerations will be thoroughly discussed in the briefing. Flight leads with NVGs will pay extra attention to not exceeding a non-NVG wingman's capabilities.

A18.5.3. Adhere to all NVG procedures, including communications (comm). The non-NVG flight member will acknowledge all changes in goggle status (i.e., "GOGGLES ON/GOGGLES OFF").

A18.5.4. Never exceed capabilities of flight members.

A18.6. Modification Procedures:

A18.6.1. **Unmodified Attitude Director Indicator (ADI) or Flight Instrument.** An ADI or flight instrument filter is required to complete cockpit modification (no light sticks are required to modify

cockpit with filter(s)). Use internal cockpit lighting normally. Place black electrical tape or green filter plastic (Glendale Green) over electronic countermeasures (ECM) control panel (if pod is loaded).

A18.6.2. No ADI or flight Instrument Filters Installed:

A18.6.2.1. Turn flight instrument light rheostat to the off position inside cockpit.

A18.6.2.2. Place one 6-inch glow stick (in holder, adjusted full open) under center of glare shield (beneath fire handles).

A18.6.2.3. Place one 1½-inch glow stick on the top center of the HSI to illuminate the lubber line, heading, distance measuring equipment (DME) and course select window, one 1½-inch glow stick on altimeter, and one 1½-inch glow stick on airspeed indicator.

A18.6.2.4. Place black electrical tape or green filter plastic (Glendale Green) over ECM control panel (if pod is loaded).

A18.6.3. Any Unmodified Console Light:

A18.6.3.1. Turn the console light rheostat to the off position.

A18.6.3.2. Use floodlights in the dim or greater position (use lowest setting required to minimize canopy reflections).

A18.6.4. Fuel Gauge or RFI Unmodified:

A18.6.4.1. Maintenance will turn off the fuel gauge and RFI lights at the balance box (if the RFI cannot be turned off, cover it with black electrical tape).

A18.6.4.2. Place one 1½-inch glow stick on both instruments.

A18.6.5. Heads-up Display (HUD) Control Panel or Weapons Control Panel Background Lights Unmodified:

A18.6.5.1. Turn the light control rheostat (on the weapons control panel) to the off position.

A18.6.5.2. One 6-inch glow stick can be placed in the upper left corner of the glare shield, but the glow stick is not required. Recommended course of action is to use the map light or finger light to illuminate the HUD control panel or weapons control panel, as required.

A18.6.6. Navigation Mode Select Panel Unmodified. This panel must be covered with black electrical tape as these lights can be dimmed only.

A18.6.7. Landing Gear Control Panel: (Peacetime training ops only does not include contingency operations.)

A18.6.7.1. Turn AUX instrument lighting to the off position on the lighting control panel.

A18.6.7.2. Place a 1½-inch glow stick on the STBY ADI, FLAP gauge, FUEL gauge, RFI, and HYD gauges.

A18.6.8. Option Select Panel Unmodified:

Turn OSP lighting off on left side of control head.

A18.6.9. RWR Control Panel Unmodified: (Peacetime training ops only does not include contingency operations.)

A18.6.9.1. Turn RWR to the off position.

A18.6.9.2. Turn RWR control panel lighting to full dim.

A18.6.9.3. Cover RWR control panel with black electrical tape. Display is compatible.

A18.6.10. **Master Caution Panel Unmodified.** Cover the master caution panel with black felt after takeoff, above 2,000 feet AGL and prior to NVG use. Be sure to remove felt prior to landing. (Peacetime training ops only does not include contingency operations) (NVG IPs only).

A18.6.11. **ALE-40 Control Panel Unmodified:** (Peacetime training ops only does not include contingency operations.)

A18.6.11.1. Turn to the off position unless the ALE-40 is required for flight operations.

A18.6.11.2. If required for flight (i.e., combat sortie), both chaff and flare armed lights must be covered with black electrical tape.

A18.6.12. **ECM Control Panel Unmodified.** Currently no ECM control panels are modified for NVG use. The ECM control panel must be covered with black electrical tape or green filter plastic (Glendale Green) if an ECM pod is loaded.

Attachment 19

(USAFE) USAFE MINIMUM SUMMARY

A19.1. Weather Minimums. [Table A19.1.](#) dictates the weather minimums required for several training events.

Table A19.1. Weather Minimum Summary (In Feet/Km):

Event	Minimum
Formation Takeoff	300/1.6 or PWC*
Formation Landing	500/2.4 or PWC*
VFR Rejoin	1,500/5
Low Level Navigation	1,500/5 (2,000/5 where minimum altitude 1,000 AGL) (8 km in ATC-controlled airspace)
Touch-and-Go Landings	500/2.4
Approach to Field Without DoD Minimums	1,500/5
*Whichever is higher	

A19.2. Minimum Altitudes. [Table A19.2.](#) lists the minimum altitudes required for various events and chase positions.

Table A19.2. Minimum Altitude Summary (In Feet):

Event	Minimum
Aerobatics/ACBT/Stalls/Man Reversion	5,000
Change Lead	500 (see note)
Chase (emergency)	300
Chase (IP/SEFE)	50
Formation Low Approaches	100
Low Approaches	Not to touchdown
Knock-It-Off	1,000
Note. 1,000 feet over water; 1,500 feet at night/IMC unless on radar downwind.	